ENGINEERING AND MINING JOURNAL

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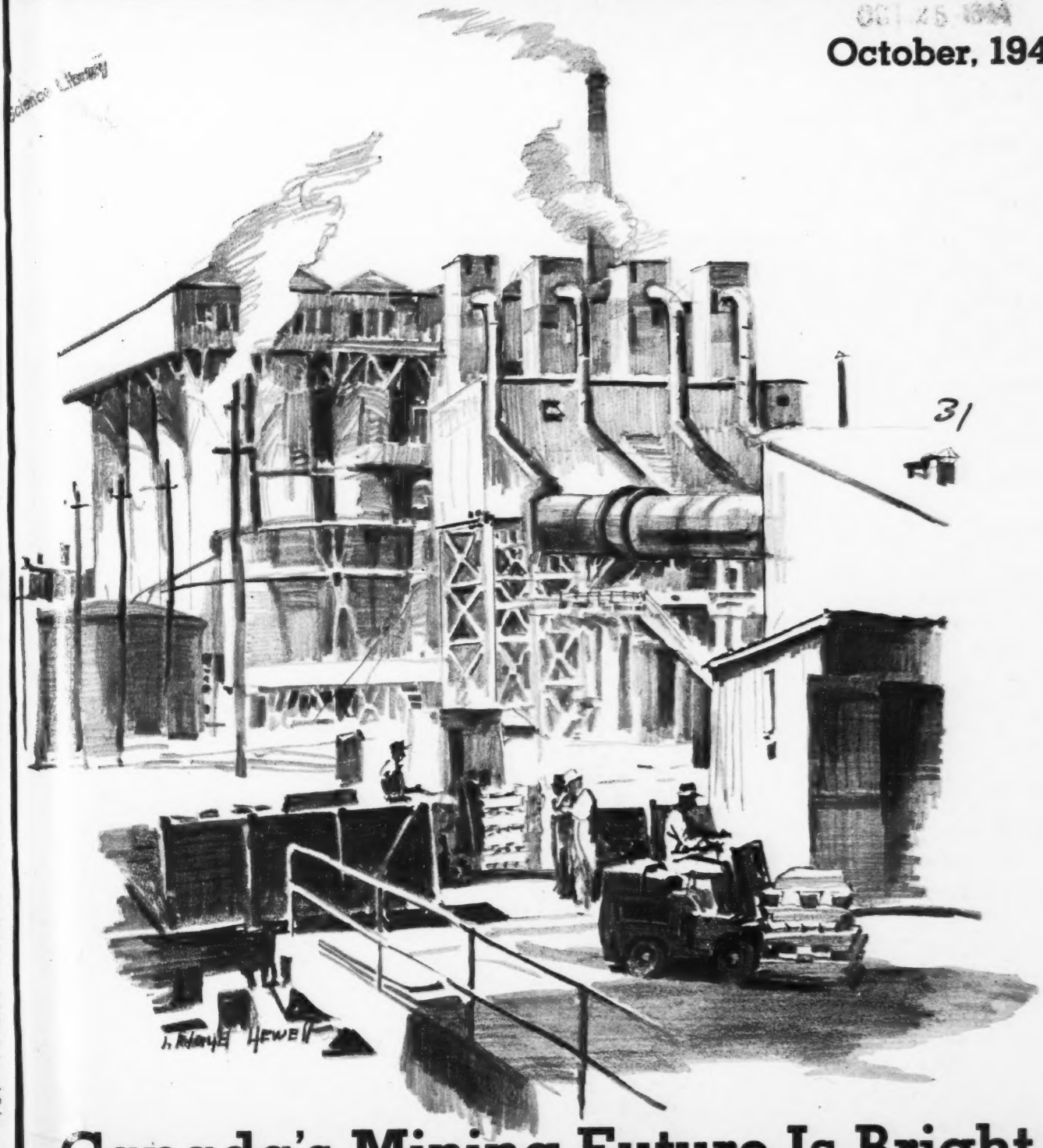

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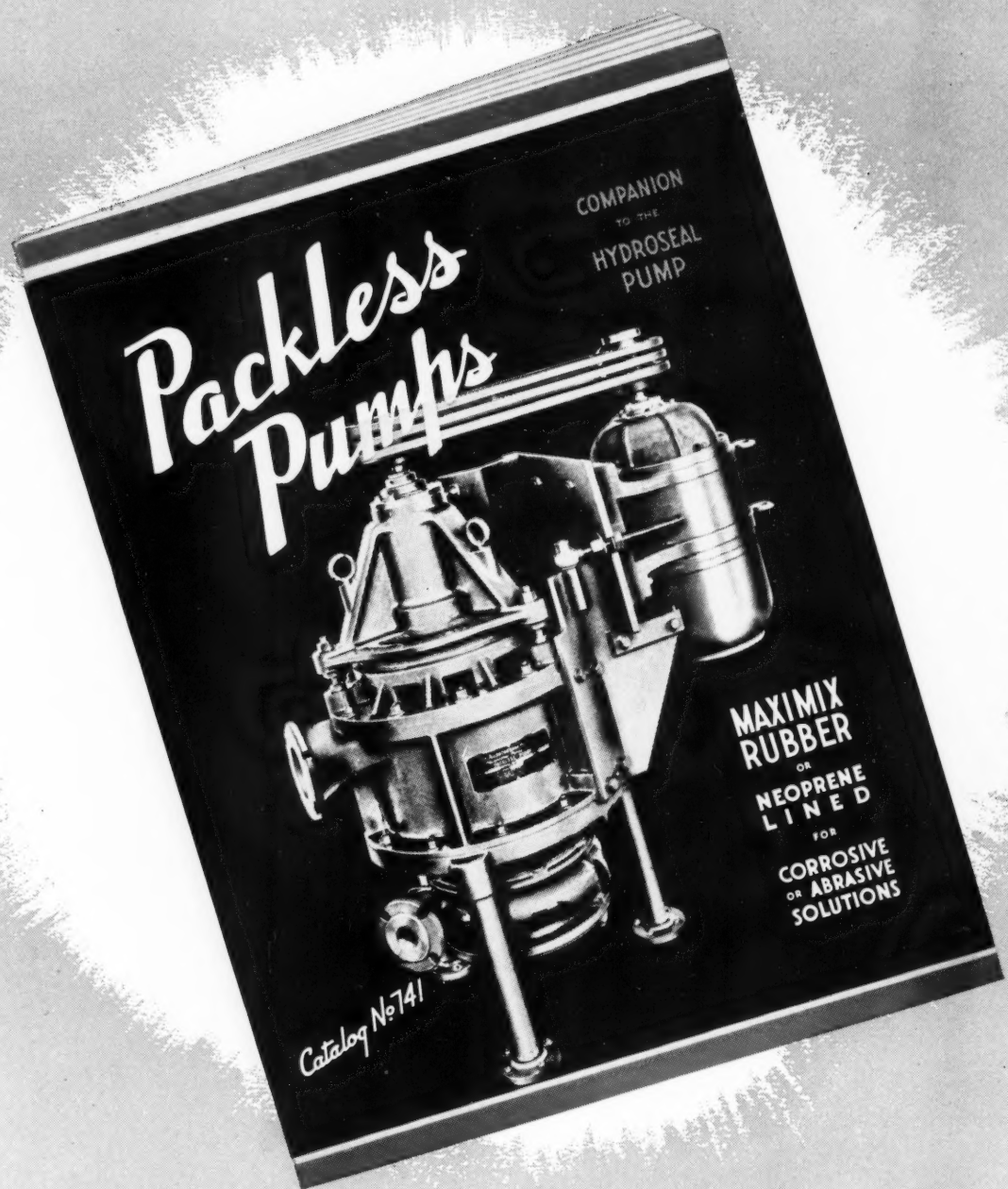

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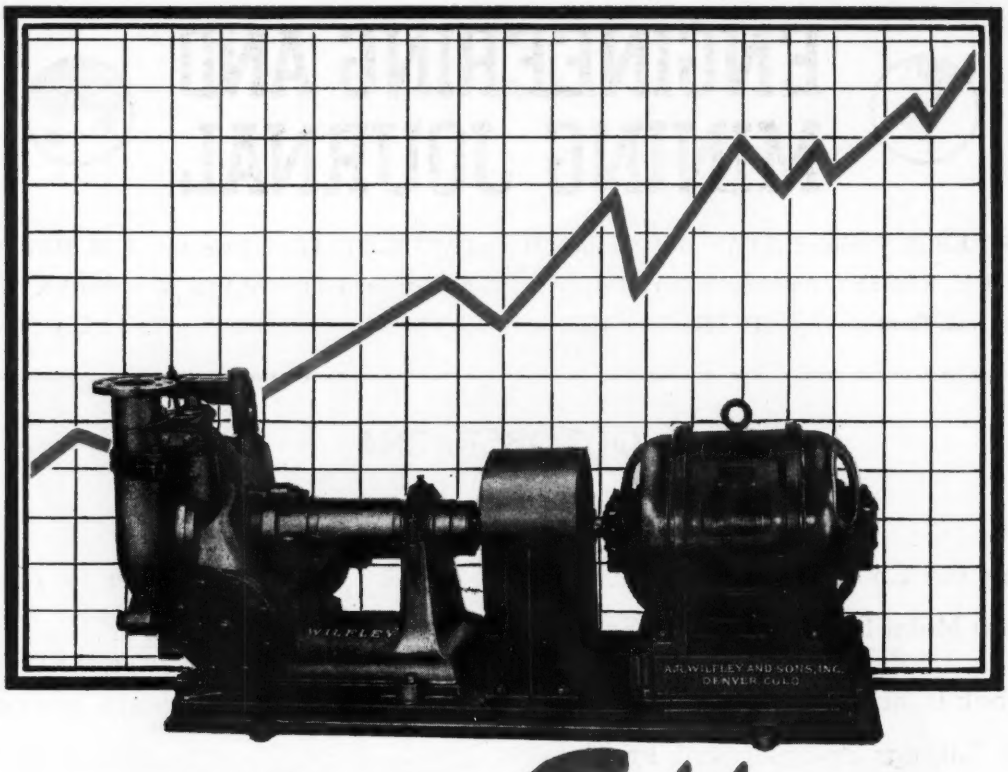

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Evan Just, Editor

Surplus Act Affords a Breathing Spell

NOW THAT some definite action has been taken with reference to mineral stockpiling it is an opportune time to scrutinize the import to the mining industry; also to prepare for such future action as seems indicated.

The outstanding fact, from the industry viewpoint, is that we are saved for a period of 12 to 15 months after the effective date of the Act from a possible avalanche of government surpluses of minerals and scrap into the industry's markets. This will be gratifying to most people in the industry because they can at least look forward to reasonably safe market conditions for the period of reconversion following Germany's defeat. Whether the 15-month interim will get us beyond the war with Japan is anybody's guess at the present time.

Some parties who recall the inside of the doghouse may have misgivings over the situation, distrusting the government's long-term willingness to let private enterprise alone. They will fear that large inventories in government hands, no matter how carefully safeguarded, will have a softening effect on the market.

Apart from the special features affecting minerals, everyone who holds for businesslike administration of surplus property will be displeased at the compromise creating a three-man board. The entire history of government operations during the war points away from this type of control, as it is bound to lead to dissension, delay, politics, and sectionalism, no matter how good the intentions of the three men chosen.

Returning to the mineral provisions, in a sense the bill is upside down. Logically, the minerals which the owning agencies save for the needs of the present war are the ones which should be stockpiled for a future emergency, if any remain. At present, minerals declared surplus for present wartime needs, minus a six-month backlog for consumers, will go irrevocably into the permanent stockpile. As long as these surpluses are of desirable grade for war purposes, such a procedure is satisfactory. However, if some surpluses are off-grade and non-beneficiable, such as the large stocks of non-strategic mica purchased to stimulate production of strategic grades, it will be illogical if they are declared surplus and automatically committed to the permanent stockpile, while the more useful materials, not declared surplus within 15 months, may possibly be sold.

To avoid such a comic-opera result, the discretion permitted to the owning agencies may be an "out," but these agencies may find it difficult to justify non-declaration of unneeded stocks as surplus, particularly if they are pressured by interested congressmen.

The Act will also be criticized by the Army and Navy because the present arrangement does not give them any discretion in disposing of materials which they consider no longer of military interest in the quantities accumulated.

Another feature is that the law contains certain inconsistencies. For example, it includes magnesium, but not iron or steel, which are of even greater importance to the war economy.

The Act is obviously a stop-gap, which gives the mining industry a 12- to 15-month breathing spell. In this interim, the industry will do well to lend itself to the formulation of a stockpiling policy which will have enough consistency and logic to earn support rather than opposition from the fighting services and the departments, all of which indorse the basic principle of stockpiling. To create military stockpiles with the Army and Navy having little voice in determining kinds and amounts is obviously unacceptable over the long term. Beyond emergency stockpile needs, the industry should have no objection to, and may possibly find cause to congratulate itself over, liquidation of market-softening surpluses, provided the liquidation is done in orderly fashion with care to avoid injury to productive operations. Such a course would also have the advantage of diminishing the growing impression among many "neutrals" that the mining industry is an obnoxious pressure group, unmindful of the national interest. If this feeling, already too widespread for our own good, is permitted to grow, there will be a price to pay in due course.

Free Enterprise Opposed to Government Aid

THE EDITORS' MAIL is continually replete with suggestions that we sally forth in behalf of free enterprise and wrest the tentacles of bureaucracy from the throat of industry. Certainly, it is obvious that to crusade against bureaucracy would be a very safe and popular course.

This we would be only too glad to undertake, except that our desire to be reasonably consistent gets in the way. Unfortunately, the barrier to this easy way to popularity is that many of the people who denounce "government interference" most vociferously do not let the echoes die away before they call for some new form of government aid.

Let's face it! We must recognize, except at our peril, that dependency destroys self-reliance, and that adding new forms of government assistance provides breeding spots for the multiplication of bureaucracy. If, for example, we want easy money from government to finance a venture, then we can expect the government, like every creditor, to demand a voice in our affairs.

Many of us do not realize the extent of benefits from government which we have learned to accept as our natural right, but which, regardless of their justification, aid in strengthening the web of government control over our destinies. To enumerate some of them, we have a silver purchase policy, favoring domestic production, tariffs, tax grants such as depletion allowances and unit-of-production computation of excess profits, claim-location rights, RFC loans, some payable only from production; free drilling and testpitting, premium-quota subsidies, and now stockpiling.

Would the editors, in their zeal for free enterprise, want to throw overboard such established procedures as depletion, tariff, and claim-location? Certainly not. As a matter of fact, sound national policy calls for extension of some of these benefits to stimulate exploration and development and to maintain a reasonable degree of national self-sufficiency. We simply urge realization that the future freedom of ourselves and our children depends in some degree on the extent to which we discipline ourselves in making demands on government, and identify our requests with the national interest rather than purely selfish aims.

An Open Mind on Fine Grinding

THE ABILITY to alter his beliefs, if available evidence warrants, is one of the most valuable assets an engineer can have. That this attribute is still possessed in large measure by members of the mining industry is shown, for example, by the present status of the art of fine grinding.

Ten years ago the technical literature on fine grinding contained much evidence to prove that the ultimate in performance could be attained only by using open-discharge ball mills in closed circuit with classifiers carrying huge circulating loads. We remember that quite well because we were studying hard at that time, trying to learn the best ways of doing things.

Look about the industry today. Do you find open-discharge ball mills through which circulating loads of 1,500 percent or so are pouring? Here and there, perhaps, but the most advanced practice seems to be to use a grate mill and a circulating load of about 300 percent of the new feed. In fact, one large operator has increased capacity about 11 percent by nothing more than a change from open to grate mills.

But don't put that down as permanent. The manager of a large Western mining company said to us recently, "We make these changes in our mills, we sweat over comparative tests of liners, balls, and grates, but all the time we are just nibbling at the rim of the real problem. We are scraping up pennies with one hand and throwing away dollars with the other. What we need is a wholly new grinding method." This is the sort of open-mindedness that has been responsible for the progress of the past few years and will be responsible for the new grinding methods of the future.

Mexican Mining Industry in Serious Straits

RECOGNIZING the strain under which the Mexican mining industry has been operating during the war, the Banco Nacional de Mexico makes some pertinent comments in its July bulletin on the present state of the industry and its rôle in the postwar Mexican economy. Sympathy is expressed with the miners' demands for increased wages and other concessions, which were obtained by a prolonged strike, but doubt is also entertained whether benefits will be permanent; that is, whether the price level will not again overtake buying power in a rising spiral of wages and prices.

But even this added financial burden is not the chief concern of the Mexican bank. It finds that the mining industry has made no economic headway during the war, and is not in a favorable position to face the postwar period. Taking the industry's production index for 1929 as 100, the figure for 1940

was only 75.03, and for 1943 only 87.43. Even the latter increase is attributed to exploitation of rich developed ores, without benefit of the customary exploration for new orebodies.

This lack of exploration, plus the Mexican government's taxation policy, is properly regarded by the bank as jeopardizing the future of the mining industry. Rising costs of all kinds, "and the social conditions of Mexico," make mining investment unattractive and handicap the industry's future growth. Taxes are reported to be at least double those of other countries, and take no account of the profit or loss on individual operations. In the bank's opinion, the government will have to revise its fiscal policies, because mining will not be able to grow and develop without some measure of relief from the present onerous financial burdens which now handicap it.

MILLING AROUND

Cost of living has risen as follows in various Latin-American countries since 1939: Argentina and Uruguay, very little; Bolivia, 213 percent; Brazil, 28 percent; Chile, 98 percent; Columbia, 37 percent; Peru, 57 percent; Costa Rica, 61 percent; Cuba, 70 percent; and Mexico, 88 percent.

Recent developments in South America, with Brazil showing an inclination toward the anti-U.S. bloc, impress us as being deeper than mere manifestations of Axis penetration. The recent sharp cutbacks in U. S. mineral purchases in South America have been an important factor in irritating the Good Neighbors.

Aluminum was left out of the list of "strategic" minerals in the Surplus Property Act, even though its less strategic partner, magnesium, was included, simply because politicians insist on viewing Alcoa as a wicked monopoly. They seem to forget the aggressive market development and reasonable price policy of prewar days, and the tremendous technological and productive assistance of Alcoa to the war effort. Alcoa started a large expansion program two years before we elected a President on an anti-war platform in 1940.

Competent analysts believe that we are safe from a financial crisis for at least five years after the war. This may be of interest to gold producers who expect to enjoy a higher gold price as a result of currency devaluation.

News from Australia indicates that government attempts to get into the mining business during the war were expensive, inefficient, hoggish of much-needed supplies, and took manpower from more efficient private operations. This and the Mexican experience in oil operations ought to be a lesson to this country.

One way to improve our mineral reserve status is to emulate Harry E. Buchanan, of Hendersonville, North Carolina. He dreamed that he had discovered a rich mica pegmatite. Going to the dreamed-of spot the next morning, he dug, and found what he sought. The deposit is now being mined. This reminds us anew to start living right.

The recent rush in government circles to hand reconversion back to private enterprise is said to spring primarily from a panicky desire to get rid of a "hot potato." However, it also seems probable that the New Dealers foresee a difficult period, wherein it may be strategic to be on the sidelines, away from blame but ready to move in with controls if distress develops and the public becomes dissatisfied.

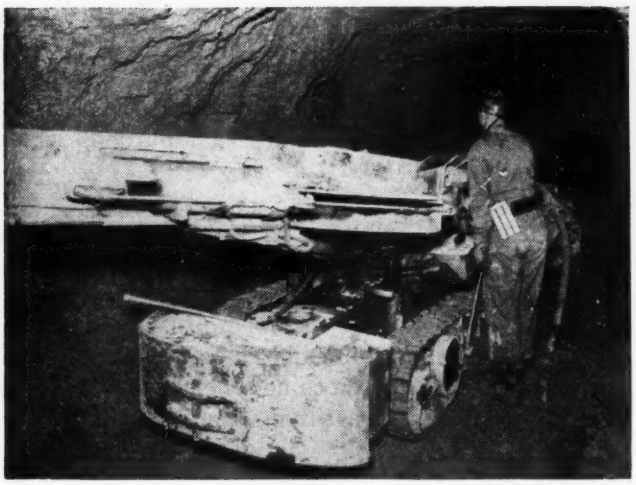
The Office of Contract Settlement is taking the position that Congress wants speed in making settlements and that in so doing the agency should err on the liberal side, if at all. In regard to contracts for mine output, it seems probable that the recovery of investments made for war purposes will be favored.

The report of the Colmer committee, condemning the post-war support of submarginal mines (p. 117) reflects a growing swing toward free-enterprise principles. However, there is some informed backing for the view that premium-quota payments should be continued if the minerals involved are needed for rapid reconversion.

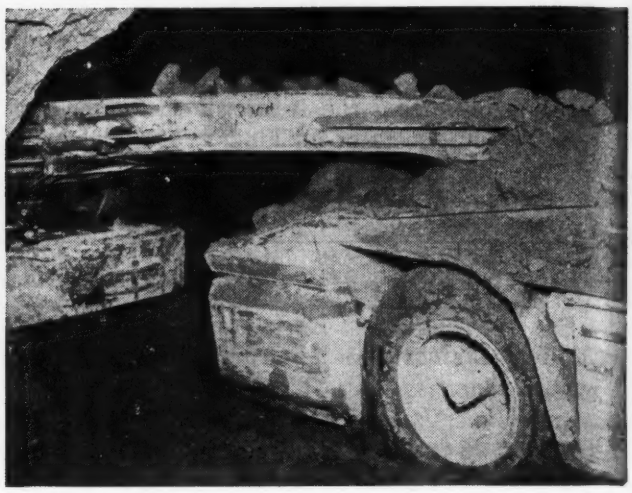
We noted recently in the New-Dealish "Atlantic Monthly" the statement that one way to achieve "universalism" in global economic relations lies in a "retreat from our attitude toward cartels." We think this indicated that, despite the extensive ballyhoo against cartels, some realization is dawning that stability in raw-material industries is conservational and may be in the public interest.

Apparently the Interior Department's potash program has flopped. The Department has not disclosed what happened to cause it to abandon the idea of a "yardstick" operation in potash production. A good guess is that the top officials reluctantly concluded that the government could not compete with private industry in this field.

Presenting the SHUTTLE



CATERPILLAR mounted loader in typical development heading.



LOADER discharging into shuttle car. Hay is spread on soft, slippery floors to improve traction.

Reynolds Corporation Selects Shuttle Car for Steep Grades

R. H. ZEGLIN, *Mining Superintendent, Reynolds Mining Corp., Little Rock, Ark.*

FACED WITH THE PROBLEM of extracting 35,000 short wet tons of bauxite ore monthly over particularly steep floor grades, and in view of impending manpower shortages, the Reynolds Mining Corp. sought and found a solution by incorporating shuttle cars, mechanical loaders, and conveyor belts in its mining operations at Brooks, Ark.

A unit consisting of two battery-type shuttle cars and a Joy loader was first installed at the No. 3 shaft in January, 1943. Subsequently two additional units were installed at the No. 3 shaft, and a fourth unit at the No. 4 shaft.

In addition to anticipated labor shortages and increased production, several other factors influenced the adoption of shuttle cars and mechanical loading equipment. Maximum flexibility was imperative because of irregular bottom-of-ore contours. The necessity of maintaining reasonable haulage grades through the irregular orebody prompted the use of equipment which would permit selective mining and sorting during development and mining operations. Dilution by waste would have resulted in prohibitive and severe silica penalties. The prospect of long average hauling distances from stope faces to shaft indicated that conveyor belts would be necessary.

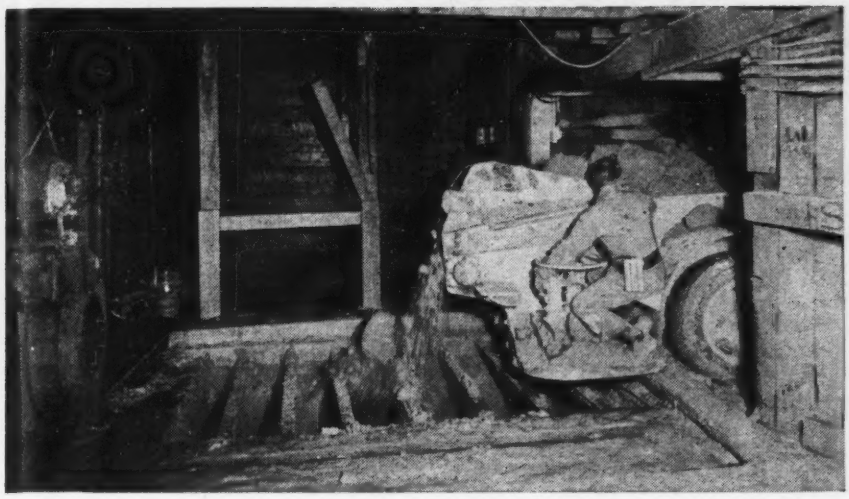
VERSATILITY of the shuttle car permitted its use in two Arkansas bauxite properties where unusually steep grades and muddy floors challenged performance. The Republic Mining & Manufacturing Co., using cable-reel cars, and the Reynolds Mining Co., using battery-type cars, demonstrate further adaptation of the shuttle car to non-metallic mining. Design modifications and the first use of dual driving wheels are discussed in these summaries, which are suggestive of the application of rubber-tired haulage to other types of underground mining.

A previous article describing shuttle-car operations in two Carlsbad potash mines appeared in the May, 1944, number of *E.&M.J.*

Plan Mine for Cars

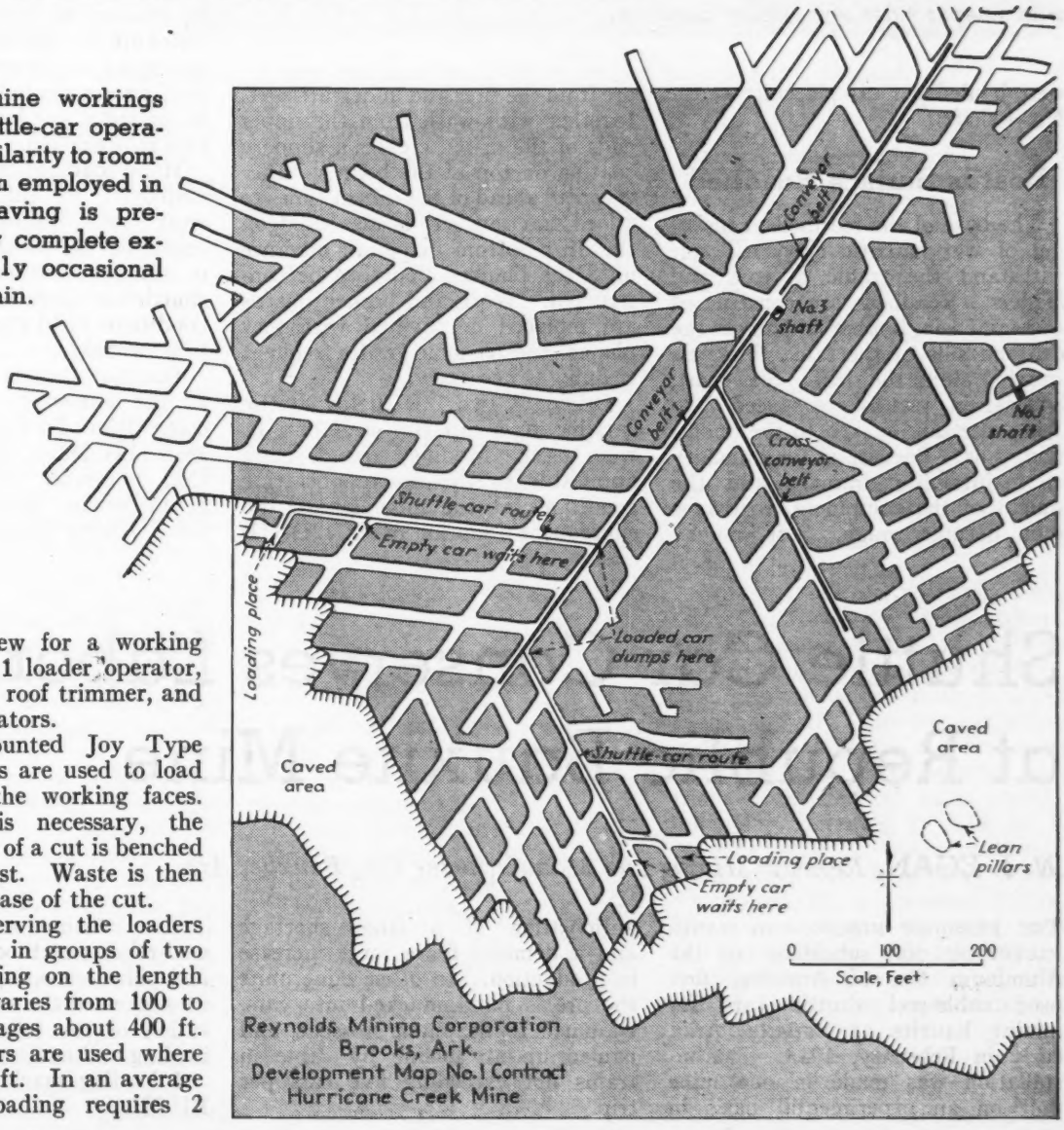
Accordingly, the present room-and-pillar retreating system was laid out especially to accommodate shuttle-car operations. See plan of mine. Drifts and crosscuts average 11 ft. in width and from 7 to 8 ft. high. No timber is required to support the arched backs. Drift intersections are driven at 60-deg. angles to facilitate car movements on turns and to minimize unsupported spans. Depending on the thickness of ore and the condition of the back, room sizes seldom exceed 20 ft. in width and 30 ft. in length. Floor grades are frequently as steep as 10 percent during development work, and approach 6 percent in mining operations.

CAR ... A further survey of current practice



SHUTTLE CAR discharging load through grizzly into loading pocket of No. 3 shaft. As development faces advanced away from shaft, 30-in. conveyor belts were installed to carry ore from shuttle cars to shaft.

SECTION of mine workings laid out for shuttle-car operations. Note similarity to room-and-pillar system employed in coal mines. Caving is preceded by nearly complete extraction. Only occasional lean pillars remain.



An average crew for a working place consists of 1 loader operator, 1 loader helper, 1 roof trimmer, and 2 shuttle-car operators.

Caterpillar mounted Joy Type 11 BU-8H loaders are used to load shuttle cars at the working faces. Where sorting is necessary, the upper, richer part of a cut is benched up and loaded first. Waste is then loaded from the base of the cut.

Shuttle cars serving the loaders operate singly or in groups of two or three, depending on the length of haul, which varies from 100 to 800 ft. and averages about 400 ft. Three shuttle cars are used where hauls exceed 700 ft. In an average loading cycle, loading requires 2 min.; and hauling, dumping, and returning require 10 min. and 47 sec.

Loads are discharged from the elevated end of the conveyor on the cars and carried by 30-in. conveyor belts to skip pockets of the mine shafts. With four cars in operation per shift the expected capacity of the No. 3 shaft operation is 560 short wet tons. No. 4 shaft is expected to handle approximately 168 short wet tons with only two cars in operation. The absence of spare cars at the No. 4 shaft accounts for the lower expected capacity per car. During May, 1944, performance records showed that 106.5 short wet tons were hauled per car per 8-hr. shift at the No. 3 shaft. and 102.5 short wet tons

BOTTOM CONVEYOR in original style shuttle car. **The adherence of sticky ore to sides as shown here led to the adoption of a modified design with steeper sides and smaller hoppers.**

were hauled per car per shift at the No. 4 shaft.

Boards Surface Roadbed

The base of the roadbeds, consisting of wet bauxitic clay, will not withstand the traffic of cars and loaders. Roadbeds are constructed of 3- and 4-in. lumber laid across the drift on sills of the same thickness running along the drift. Six, eight, and ten-in. planks are spaced 2 to 3 in. apart and spiked to the underlying sills. Because of the difficulty of maintaining drainage and the weight of the equipment, roadways soon become rough. Soft, mucky ore from the tires and undercarriages, together with wash from the upper ends of the drifts, creates a slippery coating on top of the boards. Hay is spread ahead of the cars at times to afford traction. It is also used on the drift bottom to permit advance until the planked floor can be constructed. Worn and broken boards are replaced or covered with new planks, and on some grades frequent cleaning is necessary.

Originally two 42D-10 Joy shuttle cars having a capacity of 200 cu. ft. were used. Modified design more applicable to the severe operating conditions at the mine led to the subsequent adoption of six 42D-11P cars having a capacity of 150 cu.ft. capable of carrying 4.2 short wet tons. This model is 21 ft. 2 in. long, 7 ft. 9½ in. wide, 50 in. high, and has a road clearance of 11 in. It is equipped with a chain-type bottom conveyor, which is fitted with scraper flights and elevated on the discharge end. A 7½-hp. motor drives the conveyor.

Power is supplied by 96 v. 440 amp.-hr. 48-cell Philco batteries which are charged on the cars in the middle of each shift and for about three hours between shifts. A spare battery for each car is charged while the mounted battery is in operation during the shift. Charging stations are equipped with 24-ft. rollered racks, one on each side, on which batteries may be moved to any desired position. An overhead crane lifts the batteries from the cars to the racks. Charging equipment consists of a 25-kw. motor-generator set with ampere-hour meters for charge control. Two 48-cell batteries may be charged at one time. The batteries are charged at a constant voltage of 2.7 v. per cell. Four battery stations are located at various points in the mine, one for each two shuttle cars in operation.

Hand loading and tramming were employed in initial development work until mechanical equipment could be delivered. A comparison of the two methods indicates that shuttle-car operations under existing conditions yield greater tonnage and tons per man.

Grateful appreciation is expressed to the following for their helpful cooperation: David P. Reynolds and Donald G. Dunn, of Reynolds Metals Co., Louisville, Ky.; and O. C. Schmedeman, chief geologist, Reynolds Mining Corp.

Shuttle Car Conserves Labor at Republic Bauxite Mine

W. J. EGAN, *Republic Mining and Manufacturing Co., Bauxite, Ark.*

THE REPUBLIC MINING AND MANUFACTURING CO., subsidiary of the Aluminum Co. of America, first used cable-reel shuttle cars for mining bauxite at Bauxite, Ark., early in February, 1943. The installation was made in one mine unit on an experimental basis in anticipation of a labor shortage and a demand for a large increase in production. In other mine units the ore is hand mucked into cars, trammed to the main crosscut, and hauled up an incline by cable in trains not exceeding five cars per trip.

The existing similarity between coal-mining methods and the room-and-pillar retreating system at Bauxite suggested the experimental adaptation of the following mechanical loading and hauling equipment:

1 loading machine—Joy type 11 BU-8H

OPERATOR discharges shuttle car load on 30-in. conveyor belt in main crosscut.

2 shuttle cars—Joy type 42-E-11P (d.c. cable reel)

1 motor generator set—Louis Allis—50 kw. 250 d.c. 250 amp.

1 conveyor belt—Barber Greene—30 in. wide, 800-ft. pulley centers

3 fans—1 Buffalo, 2 Jeffrey

Mining Conditions

The partly developed orebody in which the equipment was installed necessitated several changes. Refer to mine map. The 10x7 ft. main crosscut was enlarged to 20x7 ft. to allow room for the conveyor belt and permit movement of the shuttle cars and loader up and down the slope. Haulage drifts and stopes were widened from 10x7 ft. to 12x7 ft. Originally stopes were developed on 27-ft. centers, but later changed to 54-ft. centers to prevent the ground from riding and smashing the pillars.

The orebody varies in thickness from 6 to 30 ft. and rests at a slope of approximately 25 percent. A 6- to 10-ft. bed of non-commercial lignite lies directly over the ore. Unconsolidated sands compose the remaining overburden. An irregular bed of wet, sticky clay which lies beneath the ore necessitates the use of 3x12-in. gum and oak flooring in all drifts and headings. About 60 percent of the flooring is recovered before caving takes place.

The operating crew consists of: 1 foreman or shift boss; 1 loader operator and helper; 2 shuttle car operators; 1 shuttle-car cable attendant, 2 drillers; 1 roof trimmer; 1 powder man; 1 belt cleanup man; 1 chute operator; 1 car tagger; 1 hoistman; 1 greaseman; 1 mechanic.

Ore, varying in texture from fine sands to 18-in. boulders, is loaded into shuttle cars with Joy loaders and hauled to the main crosscut. Here the ore is transferred to a 30-in. conveyor belt by the elevated conveyor on the discharge end of the shuttle car. Ordinarily the speed of loaded cars is 4 m.p.h., but favorable 2 to 6 percent grades permit speeds about 5 m.p.h. Return speed of empty cars is about 3 m.p.h.

Performance

Length of haul varies from 70 to 800 ft. The following data were compiled from time studies under varying conditions:

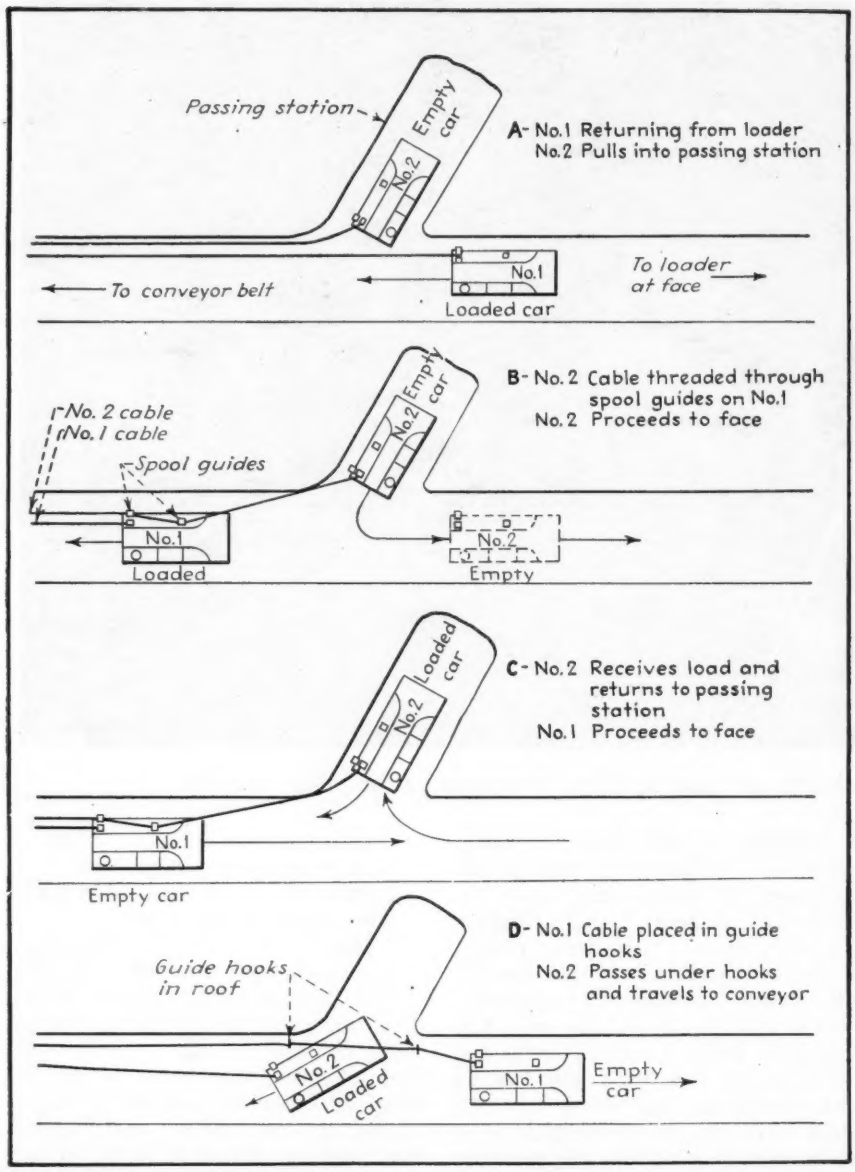
Average loading time	2 min.
Average unloading time	1 min.
Round trips on hauls,	
600 ft. (approx.)	12 min.
500 ft. "	10 min.
300 ft. "	6 min.
Less than 300 ft.	5 min.
Max. advance during development per 8 hr. shift*	23 ft.
Max. advance during development per 8 hr. shift†	38 ft.
Max. tonnage per 8 hr. shift	456 tons
Aver. tonnage per 8 hr. shift	150 tons
Aver. delay per month‡	2 days

The shuttle cars measure 20 ft. 4 in. long, 7 ft. 5 in. wide, and 48 in high, and carry about 5 tons of ore. The effective car body is 20 ft. long, 40 in. wide, and 33 in. high, except at the loading end, where the body is flared to 6 ft. 6 in. Front tires are 7.50x20 10 ply, and rear tires are 10x20 12 ply. The casings are Hard Rock lug type. Tire pressures are kept at 90 lb. in both sets.

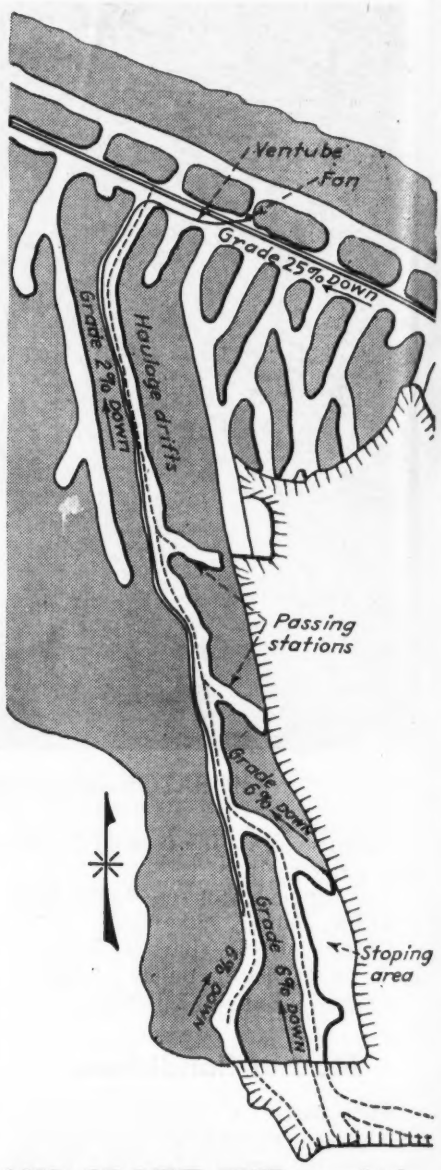
Both cars are driven through the two rear wheels by 7½-hp. motors, each connected to a wheel through a speed reducer, chain, and sprocket. The gear reduction ratio is 19.42 to 1, and the sprocket reduction is 4.28 to 1. This is the first mine in which dual drive wheels were tried. The sprocket ratio on the unloading conveyor is 2.44 to 1. A small motor drives the cable reel, upon which No. 6 cable is evenly distributed by a spooling device. The two cars are equipped with 640 and 580 ft. of cable respectively. Additional cable is spliced on with special vulcanizing equipment for extended hauls.

Both shuttle cars are used on

*One heading. †More than one heading. ‡Due to moving, breakdown, floorlaying.



SEQUENCE OF OPERATIONS permitting cars to pass in drifts without entangling cables.



MAP OF MINE UNIT in which mechanical loading and hauling equipment was installed. Shuttle cars hauled over steep and slippery grades as indicated in the drifts and stoping area.

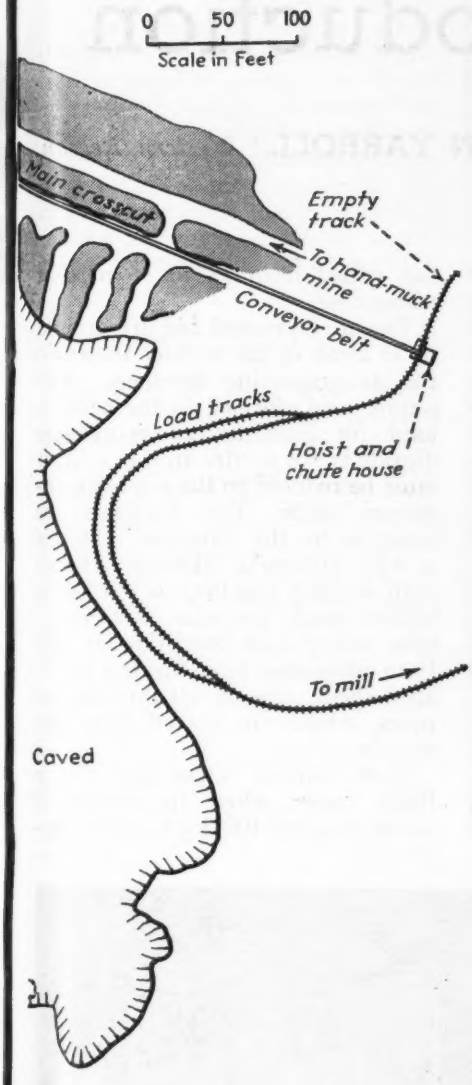
hauls of 200 ft. or more. On shorter hauls the use of two cars is not advantageous. As the drifts are too narrow to accommodate two cars, passing points must be arranged, and cables must be so handled as to prevent them from being run over or entangled.

Car-Passing System

A system has been devised to accomplish this. Refer to the illustration of car-passing operations. Two spool guides are installed on the cars, one on the unloading end and the other above the cable reel. Small passing stations to accommodate one car are driven off the drifts. One car (designated as No. 2) always pulls into one of these stations to permit the other car (No. 1) to pass. When the loaded No. 1 car passes in its trip to the main crosscut, the cable attendant lifts the cable of the No. 2 car into the guide spools of the No. 1 car. As No. 1 proceeds to the conveyor belt, its guide spools pick up No. 2 cable and let it drop over the back of the car. Two hooks are placed in the roof in front of the passing station to prevent cable entanglement. After the empty No. 1 car goes by the passing station in its return trip to the face, its cable is placed in the guide hooks, thus permitting the loaded No. 2 car to pass underneath and carry its load to the main crosscut.

To prevent short circuiting due to condensation, drying heaters are installed in all motors and operating panels. These are turned on at the end of each shift and during all non-operating periods. Control panels were raised 10 in., and the conveyor drive motor, 12 in., to prevent current leakage due to moisture. All maintenance and repair work is done underground. However, no general shop is maintained underground because of the difficulty of moving equipment up and down 25 percent grades. Cars are lubricated each night after the regular shift has shot out. A stockroom is maintained at the mine for spare parts.

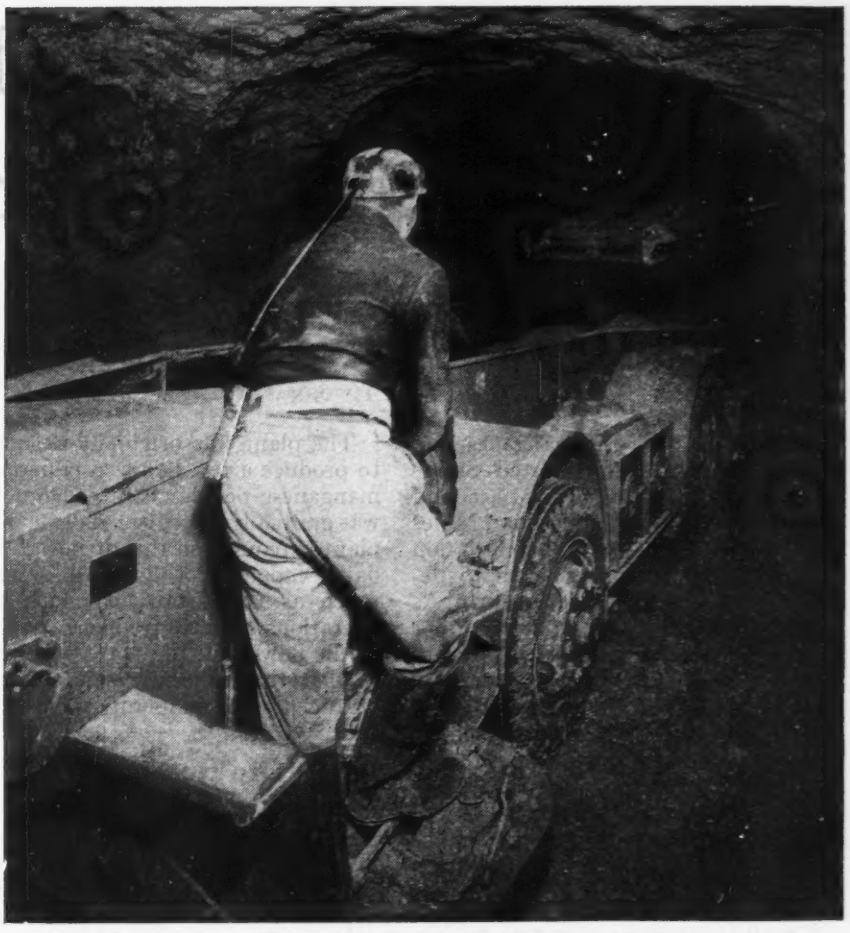
Despite such adverse conditions as steep grades, narrow drifts, sharp



turns, time lost in flooring, and time lost in cleaning mud from moving parts, the shuttle cars have been fairly successful. Although the cost per ton has not been reduced, the mechanical loading and hauling equipment has enabled the company to conserve labor. Operating conditions in the mine unit employing shuttle cars vary so much from conditions in hand loading units that no fair comparison of the two methods can be made.

F. B. Cuff, of New York, is president of the Republic Mining & Manufacturing Co., L. R. Branting is general superintendent of mines, and C. Jessup is chief engineer.

Material supplied by S. K. Colby and Douglas B. Hobbs, of the Aluminum Co. of America, Pittsburgh, Pa., is gratefully acknowledged.



SHUTTLE CAR receiving load from mechanical loader at heading. Cars performed satisfactorily in spite of mud packed around moving parts.

VIEW OF DISCHARGE END of shuttle car waiting in passing station. Wet, sticky roadbeds such as this one were floored with 3-in. lagging. Cable shown emerging from covered cable reel.

Manganese Metal Ready for Large-Scale Production

JAMES H. JACOBS,[1] **JOHN HUNTER,**[1] **and WARREN YARROLL,**[1] *Western Region, U.S. Bureau of Mines*

VIRTUALLY all of the manganese ore requirements of the United States have been imported in the past; and for several years the Bureau of Mines has been studying the beneficiation of domestic manganese ores to develop new sources of the metal. As part of this program, it built a pilot plant at Boulder City, Nev., to produce pure electrolytic manganese by a process developed by the Bureau some years ago. The purpose of the pilot-plant investigation was to operate the process using commercial types and sizes of equipment, and to make further studies of proper engineering materials and types of cell construction.

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[1] *Respectively Senior Metallurgist, Metallurgist, and Metallurgist.*

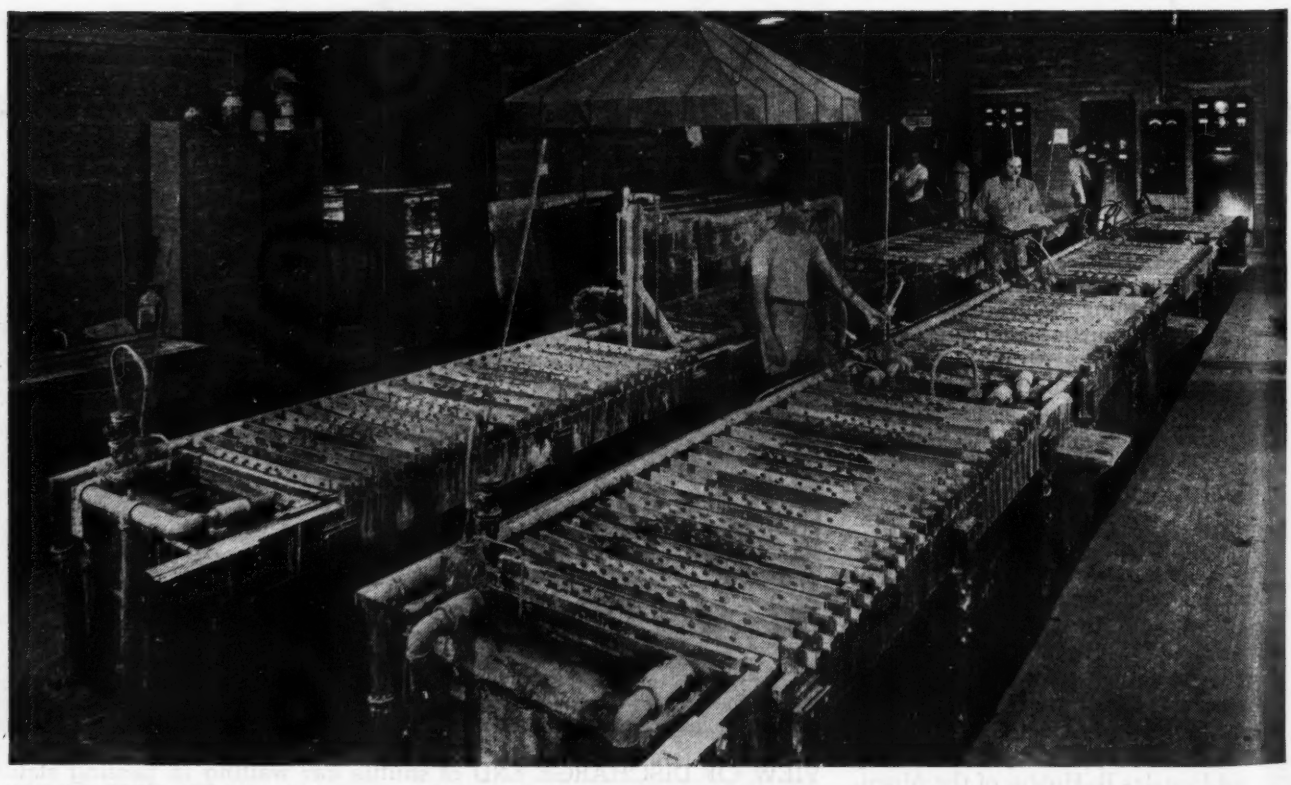
The plant was originally designed to produce a few hundred pounds of manganese per day, but the process was gradually improved and the pilot plant expanded so that it now has a daily capacity of 2,000 lb. Inasmuch as the nature of pilot-plant operations requires frequent changes in the flowsheet, the plant was built so that the equipment could be rearranged with minimum expense and time.

Ore Reduction

As the manganese occurs in most ores as the dioxide, this type of ore was chosen for the work in the plant. It was obtained from the Three Kids deposit, in Las Vegas Wash, Clark County, Nev. Either high- or low-grade ores can be used in the process; the ore employed in the pilot plant has varied from 18 to 38 percent manganese.

The ore is crushed and dry-ground to 35 mesh in the manner shown in the accompanying flowsheet. Sulphuric acid, formed in the cells, is used for leaching; as manganese dioxide is not soluble in this acid, it must be reduced to the soluble manganous oxide. Two furnaces are available for this reduction. One is a 5-ft. 10-hearth Skinner furnace with muffled hearths, so that it is indirect-fired; the other is a multi-tube rotary kiln consisting of five 10-in. alloy-steel tubes inside a brick-lined shell. Ore travels through the tubes, which are heated from the outside.

Each furnace discharges into a Baker cooler, where the calcine is cooled to below 100 deg C. before en-



IN THE CELL ROOM, here seen, the electrolysis is carried out in eight lead-lined wooden tanks connected in series. In the background of the cell room are the control panels for the generator.

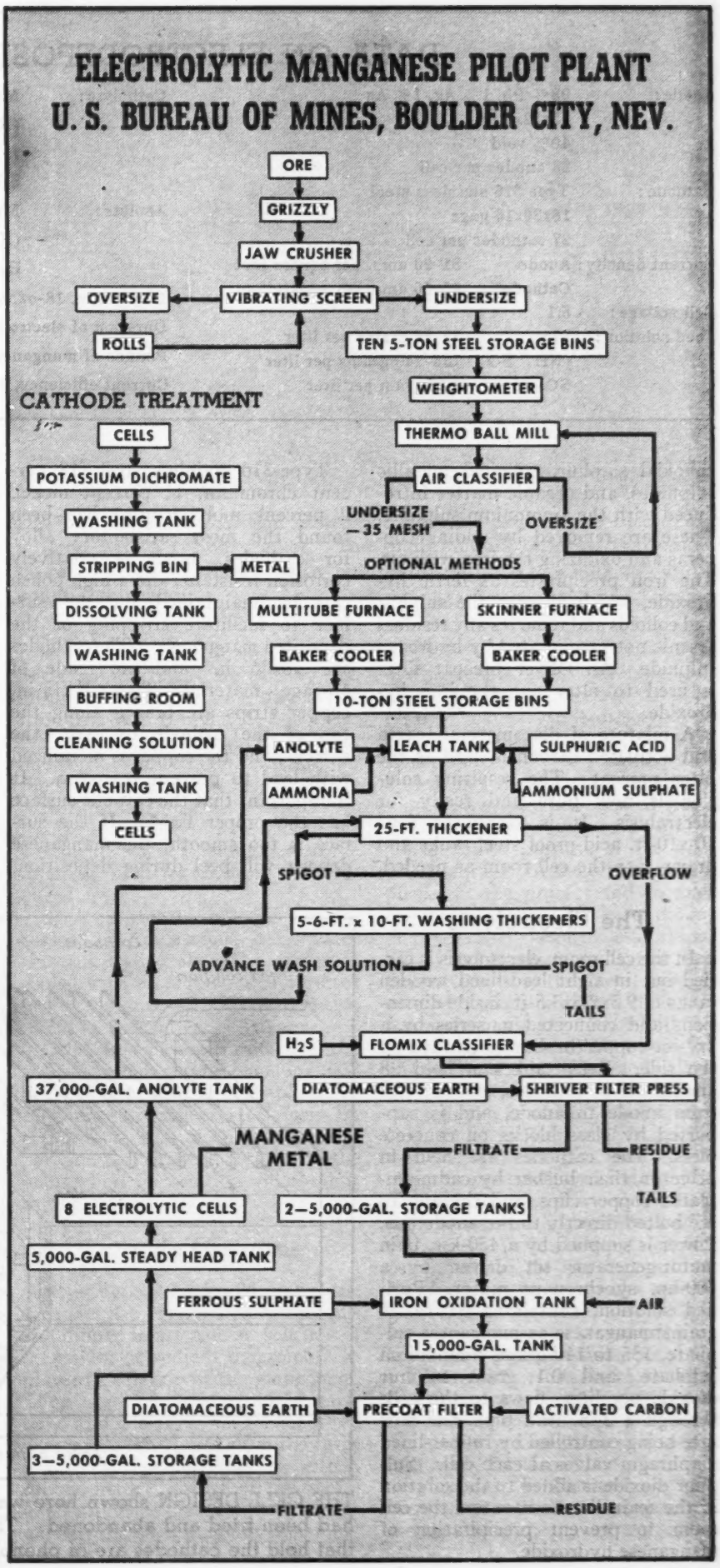
tering the atmosphere. This is necessary to prevent reoxidation. Both furnaces are oil-fired; the reduction is carried out at 700 to 750 deg. C. Reduction is accomplished in the Skinner furnace by dropping oil on the fourth hearth, and in the multitube furnace by adding oil to the ore as it enters. Calcine discharges from the coolers into buggies and is sent to a 10-ton steel storage bin or added directly to the leaching tanks. Because manganous oxide reoxidizes rapidly in air, the calcine is not stored for more than 24 hours.

Leach Conditions

Leaching is done in 3,500-gal. batches in two 8x10-ft. brick-lined steel tanks equipped with stainless-steel propeller-type agitators. Spent electrolyte is drawn into the leach tank; this solution contains 10 to 12 grams manganese as manganese sulphate, 135 grams ammonium sulphate, and 38 to 47 grams sulphuric acid per liter. Reduced ore is then added and leached for one hour or until the pH has risen to 3.0. Sulphuric acid and ammonium sulphate are added as needed, so that the finished leach contains 32 to 36 grams manganese and 135 to 140 grams ammonium sulphate per liter. After the desired pH and manganese concentration have been reached, the leach is neutralized by adding ammonia gas. The neutral solution is pumped to a 25-ft. acid-proof steel thickener. The spigot discharge, containing barren tailings, ferric hydroxide, and aluminum hydroxide, is washed countercurrently in five 10-ft. acid-proof steel thickeners. After being washed free of manganese and ammonium sulphate, the residue is pumped to the pond. Oliver diaphragm slurry pumps are used on all of the thickeners and for discharging the leach tanks.

Besides manganese and ammonium sulphate, the neutral leach solution which overflows from the 25-ft. thickeners contains small amounts of iron, arsenic, copper, zinc, lead, nickel, and cobalt. These impurities must be removed before electrolysis. As the first step in purification, the solution flows by gravity from the neutral thickener-overflow storage tank through a Nettco Flomix agitator, where hydrogen sulphide gas is added to precipitate completely the impurities as sulphides. The solution is then pumped to a Shriver filter press, where the precipitated sulphides are removed.

Although the solution is now free of metallic impurities, it contains



DATA ON ELECTRODEPOSITION

Anode:	**98% Pb, 1% Ag, 1% As**	
	15x32x¼ in.	
	40% void	
	28 anodes per cell	
Cathode:	**Type 316 stainless steel**	
	18x36x16 gage	
	27 cathodes per cell	
Current density:	**Anode**	**81–90 amp. per square foot**
	Cathode	**45–50 amp. per square foot**
Cell voltage:	**5.1**	
Feed solution:	**Mn**	**32–36 grams per liter**
	$(NH_4)_2SO_4$	**135–140 grams per liter**
	SO_2	**0.15 gram per liter**

Catholyte:	**Mn**	**10–12 grams per liter**
	$(NH_4)_2SO_4$	**155 grams per liter**
		(calculated from NH_3 content)
	SO_2	**0.10 gram per liter**
Anolyte:	**Mn**	**10–12 grams per liter**
	$(NH_4)_2SO_4$	**135–140 grams per liter**
	H_2SO_4	**36–47 grams per liter**

Diaphragm, 18-oz. canvas

Duration of electrolysis, 24 hours

Pounds of manganese per cathode, 10–12

Current efficiency, 60–65%

colloidal sulphur, colloidal metallic sulphides, and organic matter introduced with the ammonium sulphate. These are removed by adding copperas and oxidizing the iron with air. The iron precipitates as ferric hydroxide, which absorbs the sulphur and colloids and removes any residual arsenic not precipitated by hydrogen sulphide. An Oliver precoat filter is used to filter out the iron hydroxide.

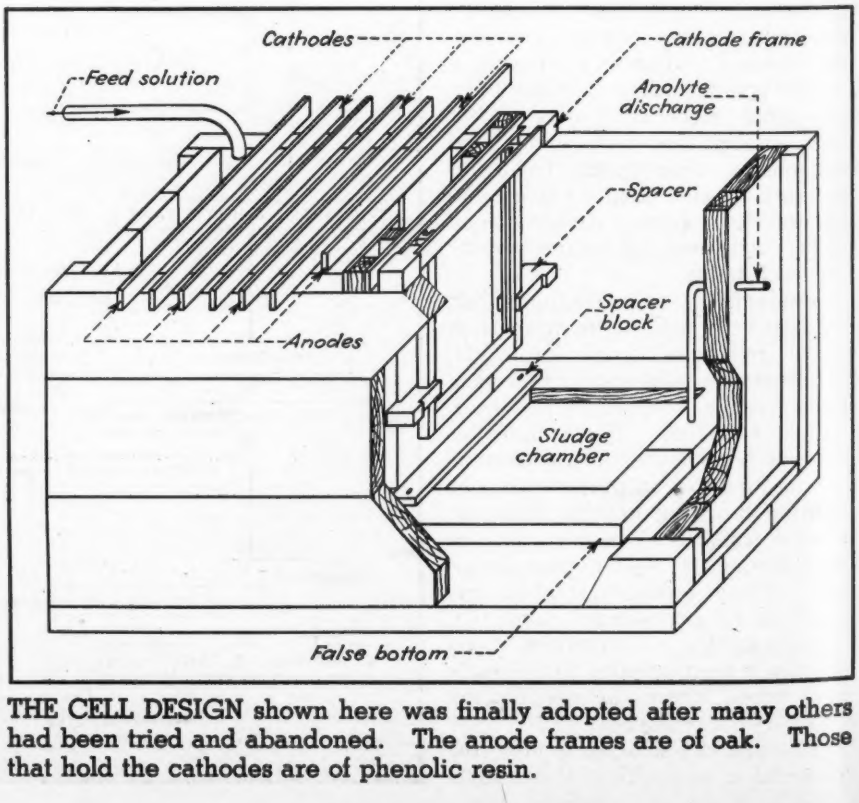
A mixture of diatomaceous earth and activated carbon is used as the filter precoat. The resulting solution is now pure and ready for electrolysis. It is stored in four 10-x10-ft. acid-proof steel tanks and drawn into the cell room as needed.

The Electrolysis

In the cell room, electrolysis is carried out in eight lead-lined wooden tanks of 9.5x2.5x3.5-ft. inside dimensions and connected in series by a 2x7-in. copper busbar suspended on the side. Each tank can hold 28 anodes and 27 cathodes, spaced 3½ in. from anode to anode, and is supported by glass blocks on concrete piers. The cathodes are held in place on their busbar by cadmium-plated copper clips, and the anodes are bolted directly to the anode bus. Power is supplied by a 450-kw. twin motor-generator set driven by a 700-hp. synchronous motor. Purified solution, containing 32 to 36 grams manganese as manganese sulphate, 135 to 140 grams ammonium sulphate, and 0.1 gram sulphur dioxide per liter, flows to the cells through a 2-in. lead pipe, the flow rate being controlled by rubber-lined diaphragm valves at each cell. Sulphur dioxide is added to the solution in the main line as it enters the cell room to prevent precipitation of manganese hydroxide.

Type-316 stainless steel (18 percent chromium, 11 percent nickel, 2 percent molybdenum) has been found the most satisfactory alloy for cathodes, as it is relatively corrosion-resistant, and a high polish can be maintained on the surface to facilitate stripping of the deposited manganese. The cathodes are 18x36 in. and are made of 16-gage material. Two 3½x1½-in. copper strips are brazed along the top of the cathode to carry the current, and the copper is metallized with lead to prevent corrosion. It is important that the cathode surface has the proper finish. If the surface is too smooth, the manganese deposit will peel during deposition, and if too rough, the deposited metal cannot be easily stripped. A polished surface is maintained on the cathode by buffing with a stainless-steel rouge every fourth day.

The anodes, 15x32x¼-in., are cast and drilled with 1⅜-in. holes to reduce the surface area 40 percent; this increases the anode current-density and minimizes the formation of manganese oxides. A lead-clad copper support is prepared by casting lead around a ¾x½-in. copper bar, which is burned to the top of the anode. The most suitable anode yet found is composed of 98 percent lead, 1 percent arsenic, and 1 percent silver. It has a life of two to three years and lowers the amount of



THE CELL DESIGN shown here was finally adopted after many others had been tried and abandoned. The anode frames are of oak. Those that hold the cathodes are of phenolic resin.

manganese precipitated as oxide at the anode to 1.5 percent, compared with 25 percent for pure lead. It was this improvement in the process that made the type of cell used practicable

For the reason that manganese cannot be electrodeposited successfully from acid solution, the anolyte and catholyte must be separated by a diaphragm. In the original process, each cathode was in a separate canvas-covered frame requiring a separate feed. The anodes were outside of the diaphragms in a common anolyte, so that the manganese oxides could be removed with the anolyte. Pure lead was used for the anodes, and 20 to 25 percent of the manganese fed to the cell was precipitated as oxides. With the development of the lead-silver-arsenic anode, it was possible to place the anodes inside the diaphragm-covered frames. In this arrangement the cathodes are all in the same common catholyte, and only one feed line to the cell is required. Because the catholyte volume is large, its composition does not change rapidly with variations in feed solution and plating conditions. With this new type of cell, the current density can be increased to 45 to 50 amp. per sq. ft., thereby increasing the daily output of each cell.

Cell Construction

Although development of the lead-silver-arsenic anode markedly reduced the amount of manganese oxides formed at the anodes, it was still necessary to provide for removing the small amount formed, which was done as follows: A false bottom with a rectangle cut out is built into the cell 10 in. above the main bottom. Oak anode frames, covered with 18-oz. canvas bags without a bottom, fit into this rectangle, forming a seal along the sides; rectangular oak spacer blocks between the frames complete the false bottom and separate the upper part of the cell from the lower. The anode frames are open at the bottom, allowing the oxides formed on the anode to fall into the lower compartment. The cathodes must be placed in a slotted frame to insure proper spacing. The cathode frames are made of a phenolic resin and have spacer blocks on each side at the bottom which fit against the anode frame. They are shorter than the anode frames, however, and do not reach the false bottom.

Solution flows through the cells as follows: The purified solution entering the catholyte from the feed line along the side of the cell flows through the canvas diaphragm into the anolyte compartment down into the lower compartment formed by the false bottom and is then discharged from the cell through a 2-in. lead pipe rising from the false bottom at one end of the cell, and out through the side at the desired height.

DEPOSITED MANGANESE is stripped from the cathodes by flexing and striking with a rubber mallet. The small amount of metal that cannot be removed thus is dissolved by putting the cathode in a tank containing spent electrolyte.

A lead-lined wood launder conveys the spent electrolyte to a tank in the basement, where it is pumped to the leaching plant for leaching more reduced ore.

The electrolyte in the cells is cooled by circulating cold water through lead coils. The water is cooled with an ammonia compressor in the summer and an evaporative cooler in the winter.

Cells must be broken down at the end of seven or eight weeks for cleaning and replacement of diaphragms. Calcium sulphate crystals form on the anolyte side of the canvas diaphragm, reducing the porosity to the point where the solution will not flow through it.

Cathode Cleaning

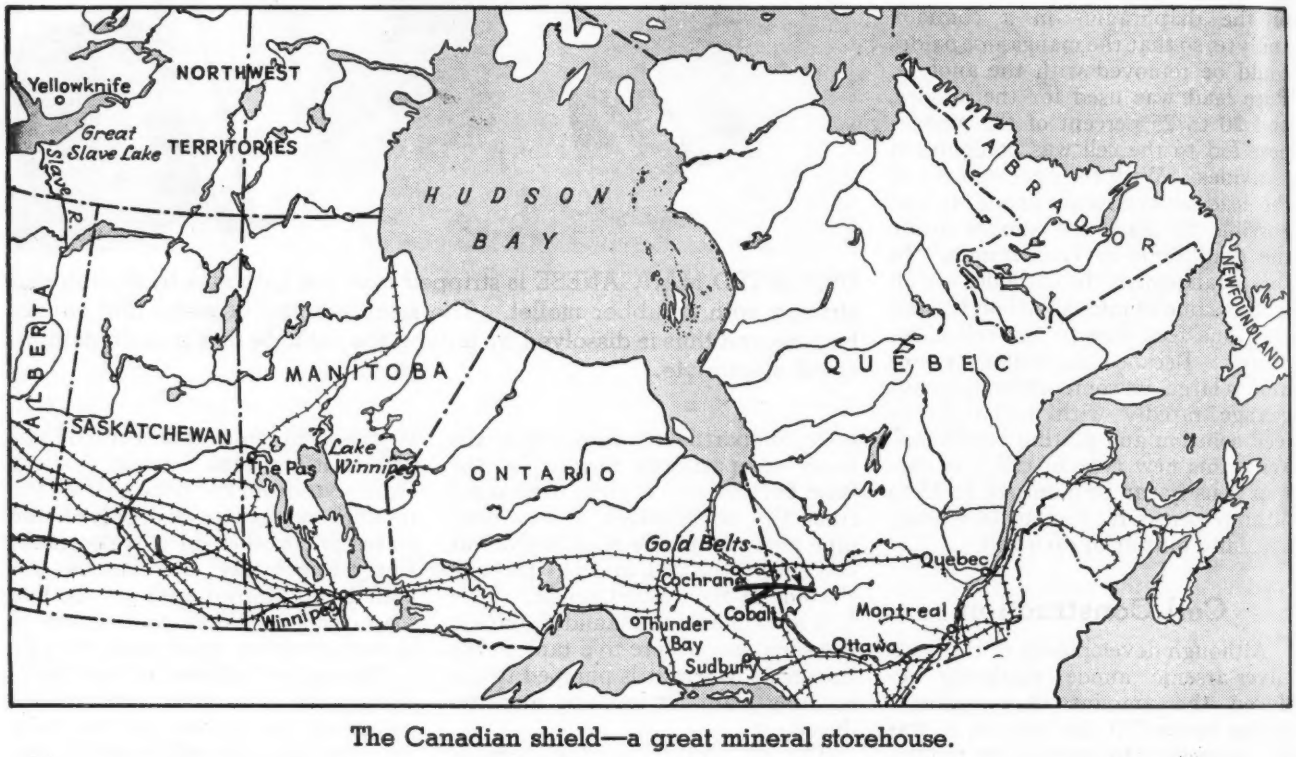
After deposition for 24 hours, the cathodes are removed from the cells and dipped in a 1 percent solution of potassium or sodium dichromate to prevent oxidation of the manganese. They are then washed in a spray tank and air-dried. The deposited manganese is stripped from the cathode by flexing and striking with a rubber mallet. Most of the metal (98.5 to 99.5 percent) is thus removed; the small amount remaining is dissolved from the cathode by placing it in a tank containing spent electrolyte from the cells. After the residual manganese is dissolved, the plates are washed in a spray tank. Every fourth day, the cathodes are buffed and cleaned with an alkaline soap cleaner. When washed free of cleaner, they are again ready for use.

The major purpose of the pilot-plant work is to study the various phases of the process and to make improvements that will lower the cost of production; nevertheless, 517,000 lb. of manganese metal has been made. Much of this metal has been used by various industrial companies for making alloys; 109,000 lb. has been used in magnesium alloys and 85,000 lb. in stainless-steel alloys. Great Britain received 62,720 lb. through the Lend-Lease Administration, and the Bureau of Mines has used 14,000 lb. in its laboratories for research on new alloys of manganese. The new 5c. coins now contain 9 percent manganese in a new alloy replacing the nickel alloy formerly used; 129,333 lb. has been utilized for this purpose up to the present. The remainder of the metal has been sent to numerous companies for small-scale experimental work.

Pilot-plant results have been encouraging, and many improvements have been made in the process, which has been advanced to the point where it is ready for large-scale production as soon as the demand for pure manganese warrants such commercial installations.

The Outlook Is Bright for Canadian Mining

R. D. HOFFMAN and ARNOLD HOFFMAN, *Mining Geologists, 452 Fifth Ave., New York*



The Canadian shield—a great mineral storehouse.

IN MARCH, 1931, we wrote an article for *Engineering and Mining Journal* entitled "Pre-Cambrian Conceptions." In it we indicated specific areas in the Pre-Cambrian shield which we thought offered constructive possibilities for mine development. Since then Canada has demonstrated that it is one of the great mining countries of the world.

The unexpected advance in the price of gold to $35 (U.S. currency), which began in 1933 and attained the new high level on Feb. 1, 1934, has stimulated gold mining in the Dominion, increasing the reserves of existing properties and making it possible to exploit low-grade deposits. The opening of new gold properties and construction of mills continued until the war forced curtailment of production.

Another stimulus to the production of base metals, the output of which was already mounting steadily, has been the insatiable war demand for raw materials. An attempt will be made here to point out the effects of these and other changes which have occurred in this eventful period and to show their significance with respect to the future.

Metallic Production

Canadian mining is a comparatively young industry. In 1920, for example, the entire metallic production of the Dominion was only $80,000,000. In 1942, this total had increased to $567,000,000, receding in 1943 to $524,000,000, due to the war.

In 1920 Noranda, Hudson Bay Mining & Smelting, the rich ore of the Frood, eastern Porcupine, Red Lake, Pickle Crow, Little Long Lac, the Hurricanaw Gold area, eastern Kirkland Lake, Larder Lake, and Yellowknife were still unknown. The fortunes of Porcupine were at a low ebb; Hollinger had managed to continue operations during the war;

CANADIAN METAL PRODUCTION

	1913	1939
Gold, oz	221,000	5,094,000
Silver, oz	29,725,000	23,164,000
Copper, lb	26,000,000	505,000,000
Nickel, lb	50,000,000	226,000,000
Platinum metals, oz		340,000
Cobalt, lb	1,188,526	733,000
Lead, lb		380,000,000
Zinc, lb		355,000,000

TOTAL VALUE OF METALS PRODUCED IN SELECTED MINING DISTRICTS

United States

District	Period	Value in Millions of Dollars
Butte, Mont.	1865–1943	2,581
Lake Superior	1850–1943	1,448
Bingham, Utah	1865–1943	1,564
Coeur d'Alenes	1884–1943	1,070
Bisbee, Ariz.	1880–1943	929
Globe-Miami, Ariz.	1882–1943	687
Jerome, Ariz.	1908–1943	578
Leadville, Colo.	1859–1943	455
Black Hills, S.D.	1875–1943	512
Comstock, Nev.	1860–1943	400
Cripple Creek, Colo.	1891–1943	390

Canada

District	Period	Value in Millions of Dollars
Sudbury, Ont.	1883–1943	1,880
Porcupine, Ont.	1911–1943	781
Kimberle, B.C.	1919–1943	600
Kirkland Lake (including Larder Lake), Ont.	1918–1943	500
Noranda-Hurricanaw, Que.	1927–1943	473
Flin Flon, Man.	1931–1943	222

McIntyre, barely surviving a dubious beginning, was still in the minor league class, and Dome had just resumed production after a long shutdown. Base-metal production, other than the nickel and copper of Sudbury, was negligible. Today Canada is an important producer of copper, lead, and zinc, as well as nickel. In 1920 mining was well down on the list of Canadian industries. Today it stands first.

War Contribution

Canada's contribution in metals to the present war effort is enormous, and shows a startling increase over production in the period of the first World War. The accompanying table compares the production of metals in 1939 with that of 1913.

Canada and the U.S.

A comparison between Canadian mining camps with those of the American West is interesting. Canada has quietly developed some of the outstanding mineral areas in the world, and this in a short period.

Noteworthy is Sudbury, which produced $1,880,000,000 to the end of 1943. Butte, Mont., is the only camp in the United States which tops Sudbury. At the present rates of production, however, Sudbury will soon overtake and surpass Butte.

Procupine, which came into being in 1911, had, to the end of 1943, produced $781,000,000. This figure almost equals the combined production of the much publicized Comstock and Cripple Creek bonanzas.

New Mining Areas

In 1931 we listed areas containing favorable host rocks for the occurrence of mines, basing this on the then existing knowledge of Keewatin, Huronian, and Keweenawan rock exposures constituting 200,000 square miles of the 2,000,000 square mile Pre-Cambrian shield. (Ninety percent of the shield is composed of granite intruding the older sedimentary and volcanic series.) It is interesting at this time to take inventory and see how far our prophecies have been realized.

Labrador: Hollinger Mines, Ltd., announces that large tonnages of high-grade hematites, comparing favorably in grade and extent to the major iron ranges of the world, have been outlined by diamond drilling in the eastern part of Labrador. Exploitation of this district awaits transportation. Apparently Labrador is about to justify earlier hopes.

Manitoba: In the Snow Lake region the Howe Sound Co. has indicated by drilling a gold deposit of medium grade containing several million tons of ore. Other prospects in the district will be aggressively developed after the war.

Thunder Bay, Ontario: This district, which for years has reported minor gold discoveries, finally entered the ranks of important gold-producing areas. Starting in 1935 with the Little Long Lac Gold Mines, and thereafter developing other properties of importance, annual production reached $9,000,000 in 1939. Some recession has taken place since the outbreak of the war, but it is to be expected that a large part of the district will be carefully examined at the first opportunity, and on the basis of results to date, extension of known productive areas can reasonably be expected. To the end of 1943 this district has produced in excess of $55,000,000.

Yellowknife, Northwest Territories: Mention was made of the Coppermine River district in 1931. The most important new gold field in this general area has been the Yellowknife camp, considerably further south, on the northwest shore of Great Slave Lake.

Shortly after the discovery of radium and native silver by the LaBine brothers in the early 1930's, gold was discovered in Yellowknife. It was not until 1936–37, however, that Consolidated Mining & Smelting undertook active work, culminating in the construction of a mill and beginning of operations in 1937 on the Con mine. This was soon followed by the Negus, Ptarmigan, Thompson-Lundmark, and Giant Yellowknife mines. This last property, which was only partly developed in the late 30's, was recently drilled by Ventures, Ltd., and today gives promise of being one of the outstanding gold deposits in the entire Dominion. A 2,000 to 3,000-ton daily producer of $10 to $12 ore is in prospect.

The Negus Mines, with only a 75-ton mill, have in the period July, 1939, to Dec. 31, 1943, produced $3,600,000, with average heads of $33 per ton. This is an extraordinary performance.

Yellowknife has received comparatively little attention, due to its remoteness and the incidence of the war, which began shortly after the area was discovered. Most of the work has so far been confined to the main Yellowknife area, which is no more than 12 miles long and 2 miles wide. A notable exception has been the Thompson-Lundmark mine, 35 miles northeast of the town of Yellowknife. In two years of operation, this mine, with a 100-ton mill, produced close to $1,900,000.

Many other properties in the out-

lying portions of the camp show unusual promise. The favorable area of Keewatin and sedimentary rocks extends northward to Great Bear Lake, a distance of 300 miles, and east and west for a radius of 150 miles from Yellowknife townsite. For several years the camp has been stigmatized as one of small high-grade deposits, but the recent Giant drilling has exploded this thesis. Curiously, the Con mine has for years past quietly developed large orebodies and had been treating 350 tons a day of $20 ore when operations were suspended recently because of labor shortage. This fact apparently did not register until the Giant drilling was undertaken.

Patricia, Northwestern Ontario: This area has long been known to contain scattered gold deposits. Only in the past ten years has serious work been undertaken, with the result that several camps and mines have been found. Outstanding has been the development of the Red Lake camp, which, after a shaky beginning, boasts of several producers and prospects of merit awaiting underground exploration as soon as war restrictions are relaxed. Patricia has a bright future, with cheaper and more plentiful air transportation expected in the postwar period. To the end of 1943 the area has yielded more than $75,000,000.

The most remarkable single mine in the Patricia area has been the Pickle Crow, which Jack Hammell pioneered and financed in the early 30's. Starting production in April, 1935, with a 125-ton mill, this property has already produced over $20,000,000. The neighboring Central Patricia mine, under the sponsorship of Fred Connell, has also made an impressive record.

Mud Lake, Quebec: Only 50 miles southwest of the Noranda district, the Mud Lake area was pioneered by the McIntyre Mines, Ltd., in the middle 1930's, and has in the Belleterre Mines one of the major gold mines of Canada. Comparatively little publicity has been given to this district, but, with McIntyre so successful, other companies are now in the field.

Porcupine-Kirkland Lake-Noranda-Hurricanaw: In 1931 particular emphasis was given to the expansion of the Porcupine belt, extending eastward into Quebec, and also a parallel belt to the south stretching from Matachewan through Kirkland Lake, Larder Lake, eastward to Noranda, and thence on to the Bell River. Recent geological and mining work has confirmed the productive potentialities of these two great regional "breaks," which have a combined length of approximately 300 miles. Since 1931, 35 new mines have been brought into production along these belts. The Kerr-Addison mine, at Larder Lake, is capable of treating 3,000 tons of $8 ore daily. Also, the Lamaque and Sigma mines, in the Bourlamaque area, Quebec, and the East Malartic and Malartic Goldfields properties, in the Malartic area, are in the major class.

In Kirkland Lake outstanding developments have been the Macassa and Upper Canada mines.

Until recently, when war restrictions on gold mining were imposed, the total production of these two belts reached $150,000,000 annually, and many attractive prospects are awaiting postwar development.

Altogether, the recent history of these district is of great significance. Muskegs along the "belts" are no longer regarded as moose pasture, but rather as localities where mines can be sought by means of diamond drilling on the basis of positive structural knowledge. As this article is being written, drilling is active and most of it is being conducted along the two great "breaks" where rock exposures are at a minimum.

Quebec: In 1926 the annual gold production of Quebec was below $500,000. Today it stands above $40,000,000. Noranda was discovered in 1923 and came into production late in 1927. From that date to the end of 1943, it has produced $265,000,000 and paid $90,000,000 in dividends. As Noranda continued to break new records in production, interest spread eastward into comparatively unknown country, until today this area is inhabited by more than 50,000 people and contains a large number of producing gold mines and lively prospects. Early skepticism of Quebec possibilities has passed, and now most of the large mining companies are active in the field. An interesting commentary on the situation is that more claims were staked in the first three months of 1944 than in all of 1943. Our prediction that mines would be found as far east as the Bell River seemed bold in 1931, but today activity has passed beyond the Bell River, 30 miles eastward, and latest discoveries in Pershing Township appear to have extended the "belt" beyond what seemed like no man's land only a few years ago.

Porcupine: In 1931 the Porcupine area was confined to the original discovery townships of Tisdale and Whitney, embracing the famous Dome, McIntyre, and Hollinger mines. However, as in the case of Quebec, exploration has been extended eastward by a slow process of projecting known structures into areas covered by heavy clay and sand overburden. As a result, the Hallnor, Pamour, Hoyle, Broulon, and Ross mines have been brought into production in the Clay Belt. A comparative newcomer, the Aquarius mine, east of Night Hawk Lake, has now indicated a large potential orebody. Encouraged by these results, geologists and engineers have carefully mapped the few outcrops and by correlation of results followed by energetic drilling along the "belt," have greatly extended favorable structures which are similar to the main Porcupine camp. This zone extends eastward to the Harker Mines and on to the Quebec boundary line, 65 miles east of the Hollinger. As noted, this belt continues eastward into Quebec, where it joins with the Duparquet, Beattie section, progressing southeastward through La Pause and Bousquet townships. Knowledge of this regional break, favorable to gold deposition, evokes intriguing speculation, but it must be remembered that the area is overlain by glacial drift and clay, making investigation necessarily slow and expensive.

Recapitulating, the following may summarize the Canadian situation:

1. Canada has entered a new phase in its mining history. With a background of production and successful development and added geological and productive experience, new developments can be undertaken with greater confidence.

2. The discovery of new deposits in Larder Lake, Quebec, and East Porcupine, which have been correlated by careful geological study, indicate two gold belts of great lineal extent.

3. The Northwest Territories, notably Yellowknife, have already given evidence of becoming a major field.

4. For the first time in many years, funds for development, and venture money by large companies which have lost their original skepticism and timidity, are available.

5. Several of Canada's mining camps have already exceeded the production of many famous American localities, and Sudbury, Ontario, is second only to Butte. More important, most of these camps are still comparatively young and have not reached their full potentialities.

Solving a Tailings Re-treatment Problem

How the Bradshaw operation, in Nevada, successfully combined hydraulicking and cyanidation over a 14-year period

ALBERT SILVER, *Metallurgist, Tonopah, Nev.*

Ingenuity, perseverance, and plain hard work combined to make a success of the Bradshaw tailings re-treatment plant near Goldfield, Nev., even though its operators faced a series of adverse circumstances almost unique in mining history. This detailed account of the enterprise is offered in the hope that it may be of value to those contemplating similar operations. The length of the manuscript requires that we publish it in three installments, of which this is the first. Parts II and III will appear in November and December.

DURING the 14 years of its life (1927–1940), the Bradshaw enterprise milled 4,117,000 tons of material taken from the tailings deposited in years past by the Goldfield Consolidated Mines Co. Gross production was $2,703,717.58. Only 2,400,000 tons of tailings was available in the dump, but when the price of gold was raised in 1933, it became profitable for Bradshaw to treat very low-grade material, including 1,717,000 tons of Goldfield tailings already put through the Bradshaw plant.

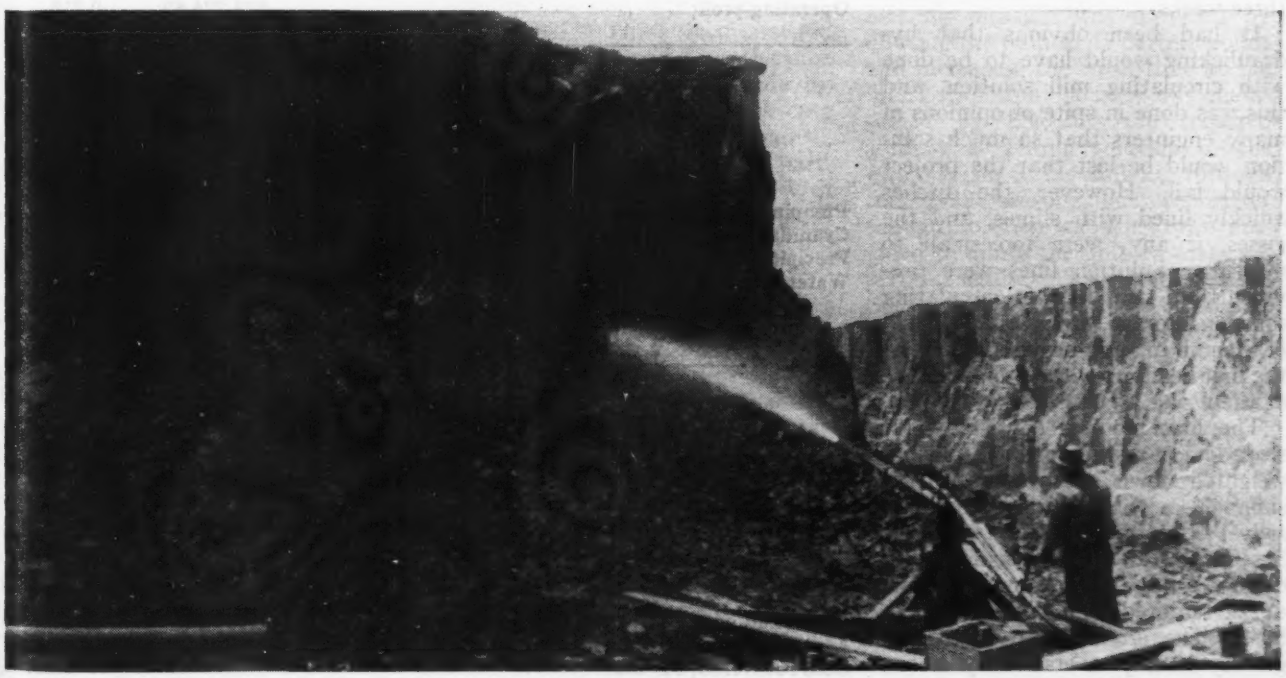
Production Record

The Goldfield Consolidated mill was a 1,000-ton plant, which in its early years turned out 1,700,000 tons of tailings carrying an average of 0.075 oz. in gold. This tonnage was deposited in the south area of the company's tailings pond. In the northern part was laid down another 700,000 tons of tailings carrying 0.04 oz. All this was eventually put through the Bradshaw plant, and 1,717,000 tons of it went through twice.

During Period 1 of the Bradshaw operation, from 1927 to 1933 inclusive, 1,720,000 tons of tailings from the south part of the deposit was milled. More than 600,000 tons of the first residues from this operation was deposited on top of the north-side low-grade tailings and thus had to be milled in the next operating period. Plant capacity in Period 1 was 1,000 tons per day.

Period 2, from 1934 to 1937 inclusive, saw the treatment of the north-side low-grade tailings plus the 600,000 tons of residues mentioned in the foregoing. Actual tonnage milled in Period 2 was 1,369,000 tons, and plant capacity was 1,250 tons per day.

Period 3, from 1938 to 1940 in-



CYANIDE SOLUTION, jetted into tailings by monitors, as shown, washed down sands and dissolved the gold. At a rate of 1,000 tons daily, operating profit for the first six years was $374,224.69

clusive, consisted entirely of the retreatment of earlier residues, which had been more or less segregated, plus a considerable layer of tailings from the second period, sweetened somewhat by taking up bottom which earlier methods were unable to clean up. A total of 1,028,000 tons was treated in Period 3 at a rate of 1,400 tons per day. The final episode ended ahead of schedule in 1940 when the water supply failed.

The flowsheet, in principle, remained much the same throughout the three periods. Briefly, it consisted of hydraulicking the tailings to a common sump, where trash was screened out; delivering the pulp to cone-bottom storage settlers in the mill by means of centrifugal pumps; and transferring thickened pulp to Butters stock agitators, followed by filtration in Butters filters. Precipitation was accomplished in a 24-leaf Merrill-Crowe vacuum leaf unit. The precipitates, which were low grade and high in copper, were shipped to the Selby smelter after drying in an electric drying pan. Details will appear in the progress of discussion to follow.

Period 1

Mining and Pumping to Mill.—Operations started in May, 1927, under the usual trying conditions, aggravated by worn-out machinery and an inexperienced crew. By way of encouragement the pump sump was drowned out twice in the first three weeks.

It had been obvious that hydraulicking would have to be done with circulating mill solution, and this was done in spite of opinions of many engineers that so much solution would be lost that the project would fail. However, the ditches quickly lined with slimes, and the losses, if any, were too small to measure. Solution lines were provided from two 30x20-ft. circulating solution storage tanks at the head of the mill to an improvised nozzle at the first heading, with 68-lb. pressure at the nozzle.

The first monitor consisted of a sled device resting on the ground, weighted down with rocks, with a short $1\frac{5}{8}$-in. nozzle mounted on a swivel attached to the box with the hose clamped to the handle. In other words, any movement of the nozzle required the movement of the hose. The eroded pulp flowed by gravity to a $\frac{1}{2}$-in. stationary screen set inside a 30x12-ft. tank, buried in the ground. A 4x4x5-ft. paddle-equipped beater box was set up

Supplies Used by Bradshaw Tailings Operation
Period 1. 1927–1933 Inc.

Tons Milled. 1,720,000

	Cost at Plant	Cost per Ton Milled	Total Used, Lb.	Consumption, Lb./Ton
White cyanide	$168,733.22	$0.098	970,064	0.564
Quicklime	97,979.93	0.057	11,285,395	6.560
Zinc dust	18,754.83	0.011	167,800	0.097
Muriatic acid	14,694.75	0.008	368,920	0.214
Explosives	11,774.12	0.007	72,950	0.042
Misc. and water	166,237.44	0.097		
Total all supplies	478,174.29	0.278		

General Cost Distribution
Period 1. 1927–1933 Inc.

	Total Cost	Cost per Ton
Direct Costs		
Labor	$230,773.81	$0.134
Supplies	478,174.29	0.278
Power	151,741.45	0.088
Total direct	$860,689.55	0.500
Indirect Costs		
Royalties	$119,025.21	$0.069
Adm. and salaries	80,252.50	0.047
Other indirect	72,709.20	0.042
Total indirect	$271,986.91	0.158
Marketing Costs		
Freight and treatment	$16,048.25	$0.009
Smelter losses	36,515.05	0.021
Bullion tax	12,632.58	0.008
Total marketing	$65,195.88	$0.038
Total all costs	$1,197,872.34	$0.696
Total production return	1,572,097.03	0.914
Operating profit	374,224.69	0.218

Operational Cost Distribution in $/Ton
Period 1. 1927–1933 Inc.

	Labor	Supplies	Power	Total
Pumping slimes	$0.044	$0.029	$0.037	$0.110
Cyanidation	0.063	0.186	0.033	0.282
Precipitation	0.019	0.017	0.011	0.047
Water supply	0.008	0.046	0.007	0.061
Total direct	$0.134	$0.278	$0.088	$0.500

Metallurgical Results
Period 1. 1927–1933 Inc.

Total tons milled	1,720,000
Gold recovered, oz.	74,371.065
Silver recovered, oz.	41,660.02
Total value recovered	$1,572,097.03
Calculated heads, oz. Au/ton	0.06425
Average tailing assay, oz. Au/ton	0.0280
Gold recovered, oz./ton	0.04324
Silver recovered, oz./ton	0.02422
Value recovered, $/ton	0.914

ahead of the screen to up break lumps.

If the pulp successfully passed this point, it would flow by gravity to a 1,160-r.p.m. 150-hp. motor-driven 8-in. Wilfley pump, also in the same sump as the tank and set at a proper elevation to pump out the tank. The pump was supposed to deliver the pulp to the head of the mill distribution launder through 1,300 ft. of 12-in. wood-stave pipe against a static head of 170 ft. This turned out to be stretching the capacity of this pump beyond its ability to perform, and a booster pump consisting of an 8-in. Morris centrifugal, belt-driven by a 50-hp. motor, was hastily installed in series to boost the pulp the last 66 ft. of head to the mill. At the end of the first season this temporary installation was replaced by a heavy-duty 8-in. Morris direct connected to a 75-hp. 720-r.p.m. motor, which served throughout the entire job.

The most we could do with ten hours of sluicing, using our best technique, was about 50 percent of the expected 1,000 tons per day. It was decided that blasting might fill in the gap, but this alone was not sufficient, so additional power was provided at the nozzle by means of a 4-in. 2-stage split-shell Krogh pump driven by a 1,760-r.p.m. 40-hp. motor capable of adding 600 g.p.m. to the flow and increasing the head 120 lb. The nozzle thereafter produced an excellent garden spray with the higher head and had to be redesigned.

New Nozzle Designed

After many attempts and experiments, a tapered cast-iron barrel was made, 40 in. long, threaded female at both ends for 3-in. standard pipe. To one end was fitted a cast-iron nozzle tip 12 in. long tapered from $1\frac{1}{2}$ in. to $1\frac{5}{16}$ in. for the first 8 in. and cylindrical for the remaining 4 in. except for a 45-deg. bevel at the outlet to prevent drooling. To the other end was fitted a 3-in. pipe nipple 4 ft. long, which connected to the discharge elbow of a 3-in. Barco joint. By adding a 10-ft. handle with counter-weights, a tripod, sled runners, a walkway for the nozzle man, and a 3-in. jetting hose on the other end of the Barco joint, a successful hydraulicking set-up was obtained. Four of these nozzle set-ups were provided to permit delivering a desirable average pulp condition to the mill; the control was obtained by establishing a time limit for each nozzle.

It might be well to explain here one of the earlier baffling phases of operating centrifugal pumps in series, such as the 8-in. Wilfley and the 8-in. Morris. The first two days of operations went by perfectly; about the middle of the afternoon of the third day the pumps refused to deliver any more pulp to the mill until after the booster pump had been shut down to take care of air lock and started up again. The correction was a proper air vent on the suction side of the booster pump. In due course a second bit of obvious education with pumps in series was taken the hard way; the sump pump was shut down first and the line between the two pumps drained before it was discovered that the operator had failed to order the booster pump down in the usual manner. When the latter was shut down, the pulp held above it drained rapidly through the open line and collapsed a fine 20-ft. joint of wood-stave pipe.

Pumps Altered

During the first period an important change was made in the design of the Wilfley pump runners in accordance with a study made of their wear. By cutting down the size of the runner shrouds the weight of the runner was decreased from 350 lb. to 210 lb. and the life was almost doubled.

The operating crew, with two nozzles in operation, consisted of one pump man, one screen man, one relief and blaster, and two nozzle men, a total of five men with a total daily wage of $27. These men assisted with the pump repairs, but the pipe changes and moves were made by the bull gang; the blaster took care of some of the ditch maintenance, but this also was, for the most part, a function of the bull gang. With both nozzles working, the daily mill capacity of 1,000 tons was delivered to the mill in six to seven hours at a specific gravity of about 1.36.

Cyanidation.—Pulp from the pond was delivered at the head of the mill into one of two junction boxes, which distributed pulp among twelve 30x12-ft. cone-bottom settlers. Each settler was equipped with a winch-operated decanter and a lever-operated plug set in a discharge cone in the tank bottom; the discharge cone was a standard-flanged 10x6-in. pipe reducer, to which the common 6-in. discharge line was attached. The decanted solution discharged into the circulating solution sump for delivery to the mill storage tanks as a part of the solution used later at the nozzles.

The underflow was pumped to one of two 34x16-ft. filter stock agitators (interconnected at the bottom). The filtering plant, consisting of two Butters boxes (10x60-ft.), each with six hoppers and a total of 320 5x10-ft. Butters leaves, obtained its feed from the two stock tanks through a hand-operated 16-in. Chapman valve. Only a single wash was provided. Caking time varied from 40 to 80 min., and the wash time from 20 to 45 min. The number of filter cycles per day averaged eleven and varied from nine to thirteen. Vacuum was at first provided by two 14x14-in. Gould horizontal wet-vacuum pumps, which were later augmented by an Ingersoll-Rand 12x6-in. dry-vacuum pump.

Many mechanical troubles were experienced because of equipment limitations, but metallurgical difficulties seemed insurmountable at first; for example, the per-ton recovery dropped to a prohibitive point simultaneously with the increase in tonnage brought about by the boost in nozzle pressure.

Experience with Goldfield Consolidated Mines Co. milling practice indicated that losses were largely in the slimes, due, for the most part, to excessively high gravities in the agitators. This condition was caused by the increased tonnage, which had thickened the pulp from under 30 percent solids to more than 50 percent solids.

It was obvious that lack of solution capacity would prevent diluting the pulp to the desired point; hence a halfway measure was provided by diluting the pulp to 45 percent solids and increasing the wash time at the filter. Solution balance was maintained by bleeding the required amount of barren solution to the water wash. This sufficed through the 1928 season, but thereafter enough solution capacity was provided to dilute the pulp to under 40 percent solids. This plan increased the recovery $0.08 per ton of tailings treated.

NaCN Consumption Cut

At the outset cyanide and lime additions were made to the pulp at the beater box (repulper) on the pond. For effective precipitation it was found necessary to maintain a solution strength of 0.20 lb. NaCN and 0.20 lb. of CaO. Before the first carload of cyanide had been used up, it became quite evident that cyanide consumption was prohibitively high. Experiments showed that the recovery could be made if protective

alkalinity were maintained and a positive trace of NaCN was present. The problem then was to build up the solution tonnage for precipitation to the 0.2 lb. NaCN required, yet maintain only a trace of NaCN in the pulp. This was done by adding the cyanide to the clarifier. In the attempt to maintain the requisite cyanide strength by adding the cyanide to the pulp, a 3-lb. consumption resulted, whereas the method finally adopted gave a consumption of less than 0.6 lb. NaCN per ton.

Gravel Trap Built

In the preceding paragraph it was stated that 0.20 lb. CaO protective was carried; this, however, does not mean that 0.20 lb. CaO was necessary to make the recovery, but that sufficient lime strength had to be maintained to aid in eliminating the large amounts of desert sand and gravel pumped up with the pulp. At the close of the 1928 season a hopper-bottomed box was fitted into a widened-out portion of the main launder coming into the mill and a 2-in. spigot fitted into the bottom of the hopper; the whole thing arranged to simulate a hydraulic classifier, discharging into a locally built 14-in. rake classifier. This device was put in simultaneously with the dilution scheme, as already mentioned, and by proper control of specific gravities, practically all of the troublesome material was removed, some 20,000 tons being discarded to waste during the life of the job. Mill pulp from the pond was maintained at a sp. gr. of 1.28 to 1.33 and additional water as required was added to the rake classifier to drop out the sands. An ordinary hydrometer set in a 1½-in. pipe on the side of the hydraulic classifier assisted in dilution control.

Precipitation.—The costs charged under this heading were not alone those of actual precipitation but included clarification, clean-up, and handling of precipitates. The precipitation layout consisted of the usual 4x10-ft. Crowe vacuum tower, a 4x6-in. Gardner Rix vacuum pump of an early vintage, a 4-in. Morris pump (with homemade water seal) to deliver the solution to a 4x4x6-ft. float box (to which the zinc dust was added under solution), and a 13x12-ft. wood-stave tank with 24 5x6-ft. bag-type vacuum leaves and a Devereux propeller for circulation through a center column over the leaves. To facilitate the removal of precipitates, 50 lb. of Hy Flo was used to precoat the leaves at the start of each precipitation period, and after this precoat about 10 lb. of filter gel was put on as a finer filtering medium to prevent finely divided precipitates from passing through the leaf at the start.

Clarification was accomplished by ordinary Butters leaves connected to a common manifold, from which the clarified solution was delivered to the clear-solution tank by means of a 4-in. Morris centrifugal pump. Approximately 2,500 sq.ft. of filter area was maintained active to yield 1,800 tons daily of clarified solution (32 leaves). When we were able to afford it, we applied Hy Flo to the washed leaves by means of a floor brush with the leaf under a vacuum. Eight leaves were washed daily and four of these were treated with muriatic acid each day.

Clean-up Procedure

Precipitates were cleaned up on the 1st and 16th of each month. On the day of the clean-up, precipitation was shut down at 6 a.m. and at 8 a.m. the clear solution was decanted down to a point about two feet above the bottom of the tank. A plug was then unscrewed from the outlet pipe and the remaining solution allowed to drain into an 8x12-ft. by 30-in. vacuum pan. The leaves were then thoroughly hosed off and the heavy precipitates washed into the vacuum pan. After the plug was screwed back into place and the leaves were reconnected, precipitation was resumed. In the meantime the vacuum pan, with its separate vacuum and filtrate pumps, was dismantled and the precipitates were shoveled up and carried by tub to an electric drying pan. The precipitates, dried to about 10 percent moisture, were loaded into the steel cans in which zinc dust was received, and expressed to the Selby smelter.

Water Supply.—This account covers all costs pertaining to water used in the mill, such as water purchased from the Goldfield Consolidated Water Co. at 65¢. per 1,000 gallons, pumping costs from various shafts, and the various installations incident to rendering the water supply available for pumping, inclusive of pumps, pipe lines, power installations, and shaft repairs. The water requirement at the mill varied from 120,000 to 160,000 gallons per day, depending on the nature of the tailings, the tonnage handled, and the tailing-disposal condition, and to obtain this much water in a desert country was one of the most difficult of problems.

The first three years of operations were supplied by buying water and by pumping from the 550-ft. Sandstorm shaft, each source contributing about equally but with both gradually on the decline. During the dry months some water was obtained from the pumping of the Goldfield Deep Mines Co. which flowed to waste below the mill. This water was so vilely acid that only a small percentage of the total requirement could be used from this source, and then only after it was mixed with the pump and thoroughly limed.

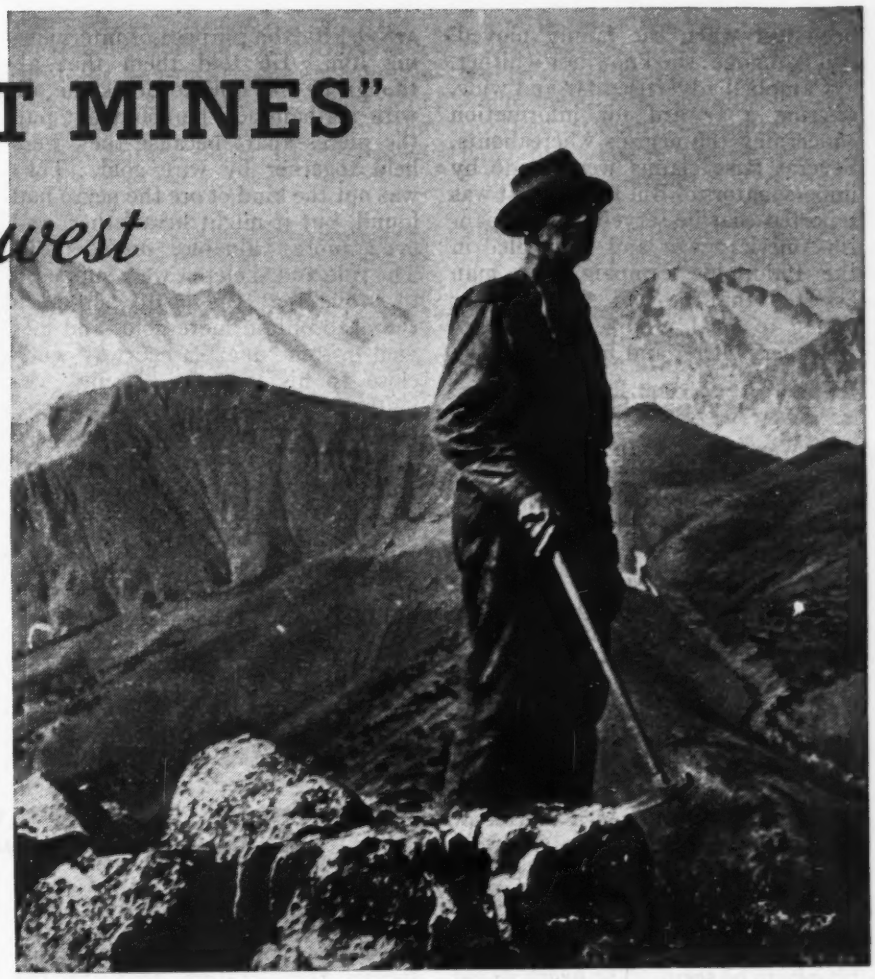
A vital step in the procurement of water was the purchase of the Jupiter property, directly north of the mill and a little over one mile distant, with a 260-ft. shaft and, incidentally, 500,000 tons of tailings comprising almost half of the tonnage treated in Period 2. Although the cost of bringing this shaft into water production was high, it proved to be one of the best water sources; for a period of ten years of pumping it supplied an average of 60,000 gallons per day during the milling season. It might be explained here that the milling operations were seasonal, approximately from March 10 to Dec. 15. The chief reason for the let-up, aside from freezing conditions, was the need for allowing water to accumulate in the shafts so that full tonnage operations could be carried on during the operating season.

Tailing Disposal Vital

The item of tailings disposal, although charged to cyanidation, is worthy of mention in connection with water supply, because on it depended the efficacy of the water supply and the tonnage which could be treated. Everything possible was done to permit discharging a high-solid content from the filters; the moisture discharged with the tailings varied from 35 percent to 40 percent, depending on the slope and distance required to reach the disposal points. When mining operations began at Sump No. 2, the residues were deposited in in the area vacated by mining operations from Sump No. 1. This procedure of mining and back-filling was carried out through the entire operation and necessitated careful planning to fit in with the mining and disposal problems, of which the water supply was perhaps the greatest. Tailings were discharged through 4x4-ft. flumes, set at a slope of ½-in. to ⅝-in. per foot, into distributing ditches; the flumes were extended as the ditches became filled from lack of grade. *(To be continued.)*

Some "LOST MINES" *of the Southwest*

T. A. RICKARD



THE LOST MINE remains lost despite repeated search by many a man, simply because in most instances the dazzling discovery reported was never more than a figment of the story-teller's imagination.

THE TALE of the Lost Nigger mine[1] is more convincing than the yarn about Pegleg Smith (*E.&M.J.*, Sept., p. 76). The name is good, because both the negro and the mine were lost. The locality in question was in the Big Bend country of the Rio Grande, in Mexico, south of the Texas border. In 1887 four brothers named Reagan drove their cattle from the Pecos Valley to the north bank of the Rio Grande where there was a ford, so that they could cross the river with their cattle. The Reagans bought their supplies at the town of Dryden, in Texas. One of the brothers met a negro that wanted employment. He was hired and came to their camp.

Bill Kelley was his name. He was a Seminole and spoke but little English; nor was his Spanish of much use. One night, when they were at the camp fire, he informed the Reagans that he had found a gold mine. They treated it as a joke. Next morning he and one of the Reagans crossed to the Mexican side in search of a stray horse. They could not find the horse, so the two men separated to examine a larger area. Late in the afternoon they met, not far from the ford. Neither had seen the horse. Bill was excited. "We's right heah clost to that gold mine. It's not more'n half a mile ovah yonder. Please lemme show it to you." He pointed eastward. Reagan told him they wanted a horse and not a gold mine. Another version of the story says that Reagan asked him why he did not bring a piece of the gold ore with him. He answered that he had been told that "If you's out by yerself and finds gold and takes some of it, you's sure to die befo' you gets in." Next we are told that in the evening Bill was attending to a horse when he heard them planning to throw him into the river and secure the gold mine, the location of which he had indicated. During the night he decamped, in fear for his life. After that the story has many variants.

One version asserts that the negro boarded a freight train for San Antonio. He went thither to see an old acquaintance, Lock Campbell, a railroad conductor, with whom he had formerly established friendly relations by giving him a haunch of venison. He had remembered that the old Scot knew something about ores. To Campbell he gave a sample from his discovery and returned forthwith to the cattlemen. A week later the Reagans found in their mail a letter from San Antonio addressed to Bill. Jim Reagan opened the letter, which said that Bill's sample had been assayed and had proved to be very rich in gold. They thought they would have no difficulty in finding the discovery; therefore at night they shot the negro and pitched his body into the Rio Grande.

Another version says that the Mexican cook at the camp warned Bill that his letter had been read and that the Reagans intended to put him out of the way. Scared, he fled during the night. It is said that he came afoot to a ranch belonging to the Stillwell brothers and that he carried a fiber bag full of rock samples, which, one of the Stillwells, a mining engineer, recognized as rich gold ore. Bill described vaguely where he had found it, and left the Stillwells to join his own people in the Santa Rosa Mountains. After that he was seen no more.

Lock Campbell said Bill informed him that the piece of ore came from the Mexican side of the Rio Grande. He had found it in a canyon. While searching for the horse he saw the sun shining on the gold in a cliff that rose above a pool of water. This was shallow, and he could see more gold glistening on the bottom.

Some weeks later, two of the Reagans went to the Seminole settlement in Coahuila in search of Bill, having heard that his mother lived there. The old woman said her son had come home with stones that showed gold, but these specimens had

[1] J. Frank Dobie, 'Coronado's Children'; p. 158; 1930.

been lost when the family moved. Bill had gone; she knew not whither.

Campbell advertised far and wide, offering a reward for information concerning the negro's whereabouts. Several false claims were made by impersonators of Bill Kelley. It was reported that he served in the Spanish-American war and was killed in the Philippine campaign. A man asserted that he had shot Bill for trying to steal a horse. The negro was everywhere, and nowhere.

A Weak Story

Now we may examine the story. If Bill found an outcrop so rich that at a distance he could see the gold shining in the sunlight, he could have detached not only a sample of ore but a piece of pure gold. Assuredly he would stop to fill his pockets with such ore, and would have exhibited it to the Reagans in proof of his story. If he was afraid of them, he would not speak of his find, but go at once to Lock Campbell. One story says that the sample assayed $80,000 per ton; that means it was about one-seventh pure gold. As a matter of fact, no assay was needed. One does not need to assay ore showing plenty of gold. The Stillwell brother did not need to be a mining engineer to recognize a gold ore if the metal was plainly to be seen. The negro would not carry samples that showed no gold, for he would have no reason to suspect the occurrence of gold except by seeing it.

The Reagans, Campbell, and many others continued to search both for the mine and the negro. Several prospecting expeditions went into the region. All were frustrated. Eventually, in 1899, Lock Campbell, Jim Reagan, a rancher named Bourland, a German named Mueller, and John Finky, a prospector, signed an agreement to seek the Lost Nigger mine. The German was included because he had taken out naturalization papers in Mexico and therefore had the right to locate a mining claim. At last they found it!

Finky discovered a rusted rifle and a dried skeleton near some quartz carrying visible gold. He took ten pounds of the ore and put it into a bag, which he buried in the ground before he reached the river. The reason for this mysterious conduct became known later. Finky made the queer request that Bourland should "take all the artillery he could raise." Evidently he was in fear of attack. Bourland delayed; he could not leave the ranch. Finky was ill, his face swelled as if he had been poisoned. Campbell and Reagan arrived for the purpose of interviewing him. He told them that although he was able to break the ore with his hammer, he could not pull the pieces apart because they were held together by wire gold. That was not the kind of ore the negro had found, but it might be another, and even more valuable, ore deposit. The rifle and skeleton were supposed to prove that the negro had been there, to obtain more gold, and had died in some unexplained way when close to his treasure. [Finky was neither a phrenologist nor an anatomist, but he recognized the skull as negroid!]

Unfortunately, as usually happens in such stories, the key man died. Finky, after recovering, found a saloon run by a friend, and thereupon he drank so much whisky that it killed him. This last statement has an element of probability. The company of mine seekers dispersed. Jim Reagan died soon afterward.

In 1918, Charles Stillwell, when in California, received a letter from his brother Will, who was serving as a Texas ranger. The brother wrote to say that he had found the Lost Nigger mine; the ore was like that given by the negro to his father in 1887, and the distance from the Rio Grande tallied with the negro's statement. Shortly thereafter Will Stillwell was killed. It is extremely dangerous to find a lost mine.

That was the last we are told about the Lost Nigger mine, except for a significant suggestion that filtered through the border from Coahuila. It is said that three Mexicans that had stolen high-grade ore from the gold mines of Las Ciénagas, fled to the Ladrones Mountains on their way to seek refuge north of the Rio Grande. When pursued by the *rurales*, they dropped a bag containing their loot, the sparkling gold ore. Soon afterward they were overtaken, and killed. Bill Kelley may have found some of this specimen stuff. Hence the story of the Lost Nigger gold mine, which has been concocted variously, but never convincingly.

Treasure in the Guadalupes

The tale of the lost gold mine in the Guadalupe Mountains of New Mexico[2] begins with a converted Indian from Tabira that, in the seventeenth century, guided a Spanish captain to a wonderful deposit of gold ore. The incident was without an appropriate sequel, because all the Spaniards in New Mexico were killed or expelled during the Indian uprising of 1680, and the guide disappeared when the settlement of Tabira was destroyed. The tradition of the gold mine survived, however. To the Apaches was accorded a knowledge of the place, because they had retreated to the Guadalupe Mountains, to share with the wild sheep a last stand against the encroachment of the white invaders.

One man dared the risk and sought the gold of the Guadalupes in much later days. In 1862 Ben Sublett had been a prospector in the Rocky Mountains, where he had learned how to seek for gold, without, however, having any success in the finding of it. His wife died, and with two little daughters and an infant son he turned back southeastward into western Texas. First he pitched his tent beside the small town of Monahans and tried to gain a livelihood by doing odd jobs on the railroad; but it was not long before the lure of prospecting seized him. He saved a little money and bought a pair of horses, together with a rickety wagon. With these he started for the Guadalupe range, and sought for gold. His neighbors warned him against the Apaches. He laughed at them. Many trips he made, unsuccessfully. During intervals he managed to obtain enough work to pay for more supplies, both for his children and for his recurrent expeditions. Then he moved to Odessa, which was nearer the mountains. One daughter was now old enough to take in washing. Her earnings were most helpful and made it easier for him to go prospecting. He began to have some success; occasionally, it is said, he returned with a small nugget of gold. His neighbors jeered at him. Still he persisted in his belief that some day he would discover the treasure in the Guadalupes, for he admitted that an Apache had told him the traditional story.

The years passed. He continued to make his exploratory trips into the mountains, and became known as Old Ben, the crazy prospector. Then one day he strode boldly to the bar of the principal saloon in Odessa, from which he turned to invite everybody in the room to join him in a drink. The barkeeper stood astounded; the onlookers laughed. Thereupon he drew forth a buckskin

[2] J. Frank Dobie, 'Coronado's Children'; p. 158; 1930.

bag and poured nuggets on the bar. Great was the excitement! He rose to the occasion, "Drink, boys," he said. "Drink all you want; I have found the richest gold mine in the world. Let's celebrate!" They did; and later they began to wonder if they also could not dip their hands into the pile of nuggets the old man had discovered. He refused to give any inkling of the whereabouts of his treasure-trove; he said that the secret was his; he challenged them to uncover it. They followed him, they spied upon him, all in vain. He eluded them easily. Usually he started at night, unexpectedly; and even if they hurried to follow on his trail, they soon lost it. He fooled them every time.

"You don't seem to have any small ones"

As before, he made his trips at irregular intervals, but on each return now he brought with him gold to the value of a thousand dollars or more. The local banker and a rancher joined in offering him $10,000 for a share in the find. He replied, scornfully, that he could take out that much in a week. Thereupon they hired a man to follow him, but Ben dodged pursuit, and appeared in town before his pursuer. Evidently, it was said, he had not gone to the mountains, but to some cache on the Pecos River where he had stored the gold.

Eventually Ben relented sufficiently to tell an old crony, Mike Wilson, how to reach the mine. Mike found the place and filled a sack with as much ore as he could carry. It was a heavy load, and he came home very tired, but so jubilant that he went on a protracted spree, after which he forgot the directions. His friend Ben Sublett only laughed at him, refusing to give him the directions afresh.

Later some men living in the Pecos valley persuaded Ben to show them the mine, but, the first night out, the party broke up when Ben suffered from ptomaine poisoning. He asserted that somebody had tried to kill him, and refused to go farther.

Was he willing to take others with him for self-protection, because a Mexican had found the place and endangered his possession of the gold? So said Louis Arthur, known commonly as Frenchy, who, in 1884, followed two Mexicans, from across the border in Mexico. Each year one of them went to the mine and brought away a load of gold ore. Frenchy had overheard some talk and had trailed the Mexicans, as he told Fred Hardesty, at whose ranch he spent the night. The ranchman was impressed by the story and offered to equip Frenchy for his trip if he would admit him to partnership. It was so agreed. Six weeks later Frenchy returned with a tale to tell. Also, he had gold-quartz to show.

He said that he had followed the Mexicans and had watched them descend into a chasm by means of a rope ladder. He saw them haul up sacks of ore, and water also, which was needed for their horses. Frenchy was in need of water himself, and could not watch them as long as he wished. However, after a few days, the Mexicans left and he proceeded at once to investigate. The chasm was a hundred feet wide at surface and only forty wide at the bottom, about sixty feet down. He had not sufficient rope to make a ladder, but he could see a cave and some freshly broken ore at the entrance. The piece of gold-quartz that he brought with him was one that the Mexicans had dropped. Frenchy rested a few days; then, with fresh supplies, including plenty of rope, he left again for the mine in the Guadalupes. He never returned. Did the Mexicans kill him?

Four years later, in 1888, Ben Sublett spent the night with a guide named Stewart, who was aiding some railroad officials to hunt for game in the Pecos country. Ben told Stewart that he was about to start for his gold mine at the point of the Guadalupes. He offered to take Stewart with him, but the guide refused to leave. Sublett returned late on the third day. After supper, when the others had gone to their quarters, Steward asked him how he had fared. For answer, Sublett took a dried hide and put it, hair down, on the ground so that the fire threw a light over the leather. Then, out of a pocket, he pulled a small sack that had contained pipe-tobacco and poured nuggets of gold from it. Stewart ran the nuggets through his fingers and spread them over the hide so that they glistened in the firelight. "You don't seem to have any small ones," he said. To this Ben replied, "What would be the use of picking a small one when with one more rake in the gravel I could bring up a big one?" In the morning, Sublett left. A few years later, Stewart heard of his death. That was in 1892.

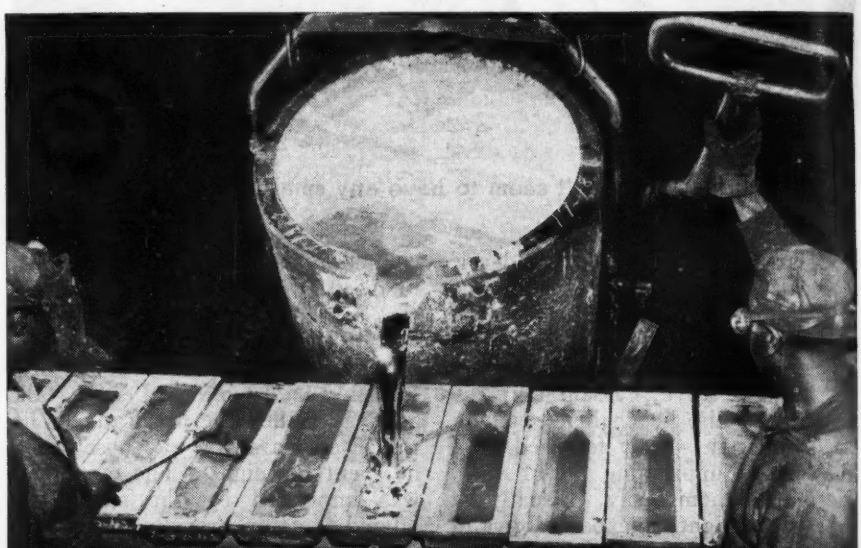
Now let us ask some questions. If Sublett made a discovery, why did he not locate a claim? Once in legal possession of his mine, he needed not to fear interference from anybody. He brought nuggets from the place; therefore it must have been an alluvial deposit. Indeed, the word "gravel" was mentioned. The Mexicans, on the other hand, obtained gold-quartz, as testified by Frenchy. Mike Wilson found "ore." Gold-quartz is gold in quartz, or attached to quartz, and comes from a vein or lode, not from a river channel. The stories disagree. Ross Sublett, Ben's son, when a boy, accompanied his father to the alleged mine, so he said. He agrees with Frenchy in mentioning a rope ladder, by aid of which his father used to descend into the chasm. He himself stayed on top, but he could see pieces of ore in plain sight in front of the cave. One cannot recognize gold ore at such a distance. What was the cave? Was it the opening of a mine or a natural cavity? Nobody says that Sublett did any mining; that is, excavating. But Sublett brought gold with him from the Guadalupe Mountains and placed it in the bank. Had he happened upon a cache, or hidden store of alluvial gold, secreted by persons unknown? Whatever the explanation, the story itself is inadequate. It reads like a newspaper reporter's yarn, than which nothing is less convincing.

There are many other lost mines, especially in the Southwestern mining region of the United States, such as the Padre, the Burro, and the Grizzly; but though they have lived long in tradition, they have never been rediscovered, despite the eager search of hundreds of experienced prospectors. *(To be concluded)*

Outlook for Magnesium

Plentiful supply of the metal and wide experience in its use during the war portend broad application to postwar civilian purposes

OF ALL THE METALS REQUIRED in the war effort, magnesium probably experienced the greatest expansion in plant capacity and production. Prewar output was at the rate of slightly more than 6,000,000 pounds per annum. By 1943 production had soared to 400 million pounds; and if peak production is reached in 1944, the figure may exceed 500 million pounds annually. Obviously the condition calls for the most careful evaluation of postwar uses of the metal—a matter to which the American Magnesium Corporation, wholly owned subsidiary of the Aluminum Company of America, has given detailed study. The accompanying notes are extracted from background data on the postwar planning activities of the American Magnesium Corporation, which is the largest fabricator but not a producer of the metal.



Ingot production of magnesium has soared from slightly over 6,000,000 pounds a year prewar, to over 400,000,000 pounds a year at present. Production and fabrication facilities insure ample supplies for consumers

Properties Discussed

Although production of magnesium is now being cut back, plants are being put in standby condition for possible future use. There have been 11 producers operating 15 plants and utilizing three basic processes. The major process produces magnesium by the electrolytic reduction of fused magnesium chloride. Brine, sea water, magnesium salts, and magnesite are the raw materials from which this magnesium chloride is produced. The other processes depend on the direct reduction of magnesium oxide, one using carbon, another ferrosilicon as the reducing agent.

The most logical approach to the problem of utilizing the expanded production facilities of the industry is to examine the properties and characteristics of the metal and discover its possible applications.

The most striking quality of magnesium is its lightness. Its weight is only 23 percent that of iron and 64 percent that of aluminum. Wherever there is mass in motion, lightness may lead to reduced operating costs, better performance, and more payload. Like most other metals, magnesium is relatively weak in its pure state, but this deficiency is overcome by alloying with small amounts of other metals. Because magnesium alloys have excellent strength-weight ratios, they should find many structural applications. Their use for such purposes, however, is not recommended where temperatures exceed 400 deg. F.

Magnesium alloys are adaptable to modern processes of fabrication and assembly, and are available in most commercial forms. They may be cast, rolled, extruded, and forged. They also possess remarkable machining characteristics, yielding a smooth finish. They may be joined by torch welding, and by electric resistance and spot welding. Riveted joints should be made with 56S aluminum alloy rivets.

Atmospheric corrosion at inland points is usually resisted by magnesium alloys, although some surface etching may occur. Precautions should be taken, however, to prevent moisture being trapped in crevices or low spots if corrosion is to be avoided. Salt water and salt spray are corrosive and may cause severe attack. Unless it is known that conditions of service are not detrimental to the metal and its alloys, it is advisable to protect them with chemical treatments that have been developed as a base for paint coatings.

Other characteristics of magnesium that may be used to advantage in some applications are its relatively high coefficient of thermal expansion, its low electrical conductivity, and its non-magnetic property. The metal has good etching qualities for photo-engraving work, is valuable in certain chemical and metallurgical uses for its deoxidizing properties, is non-toxic and non-sparking.

Civilians Can Get Metal

Until recently, all of the magnesium produced in the United States has been earmarked for war use, but

Aircraft will provide an important postwar outlet for magnesium. Among military aircraft a heavy bomber uses about 1,600 pounds, a light bomber 800, and a fighter 500.

now there is ample metal to permit civilian applications, as outlined in WPB Order M-2-b, as amended July 15, 1944. About 76 percent of the production is used in aircraft and incendiary bombs. Between 85 and 90 percent of the magnesium used in aircraft is in the form of sand and permanent-mold castings, mostly for engine parts and wheels. In the latter use it was possible to save from 50 to 150 pounds weight per plane on medium and heavy models, besides providing excellent resistance to shock and landing stresses. About 41 percent of the country's magnesium production goes into incendiary bombs and other pyrotechnic uses such as flares and tracer bullets. This constitutes the greatest single use of magnesium at the present time.

Postwar, the field of land transportation gives promise of developing into a very fertile market for magnesium, on account of the lightness and strength of magnesium alloys. Their use improves efficiency and increases payload. The merits of light metals in passenger automobiles are also being investigated, although it seems unlikely that they will be used extensively in structural parts. The outlook for magnesium in buses and trucks is more encouraging, because a pound of payload can generally be added for every pound of dead weight saved. Economies of operation also result in saving on tires and gasoline. It is expected that magnesium can be used for many structural purposes above the floor line, as well as in engine parts and for other applications.

The field of portable equipment is also expected to provide a market for magnesium. Wherever an article must be lifted or moved about, it becomes a potential market for the metal. In the foundry, for example, pattern plates, foundry flasks, and core boxes made of magnesium offer many advantages. Other obvious applications would be typewriters, pneumatic tools, welding equipment, and portable unloading conveyors.

In the chemical industry, magnesium will find application on account of its resistance to the action of alkalies, borates, fluorides, and chromates. It is used also as a catalyst in certain chemical processes, and as a deoxidizer and scavenger in non-ferrous metallurgy.

The electrical industry is another field which gives promise of developing into a better postwar market. Various parts made of magnesium in the prewar days were plates for rectifiers, circuit-breaker parts, disks for registering meters, fuse wire, degasifiers in radio tubes, radio transmitting and receiving cases, housings for street-car motors, fans for electric motors, and as a low electrical conductivity alloy for the rotors of high-torque motors.

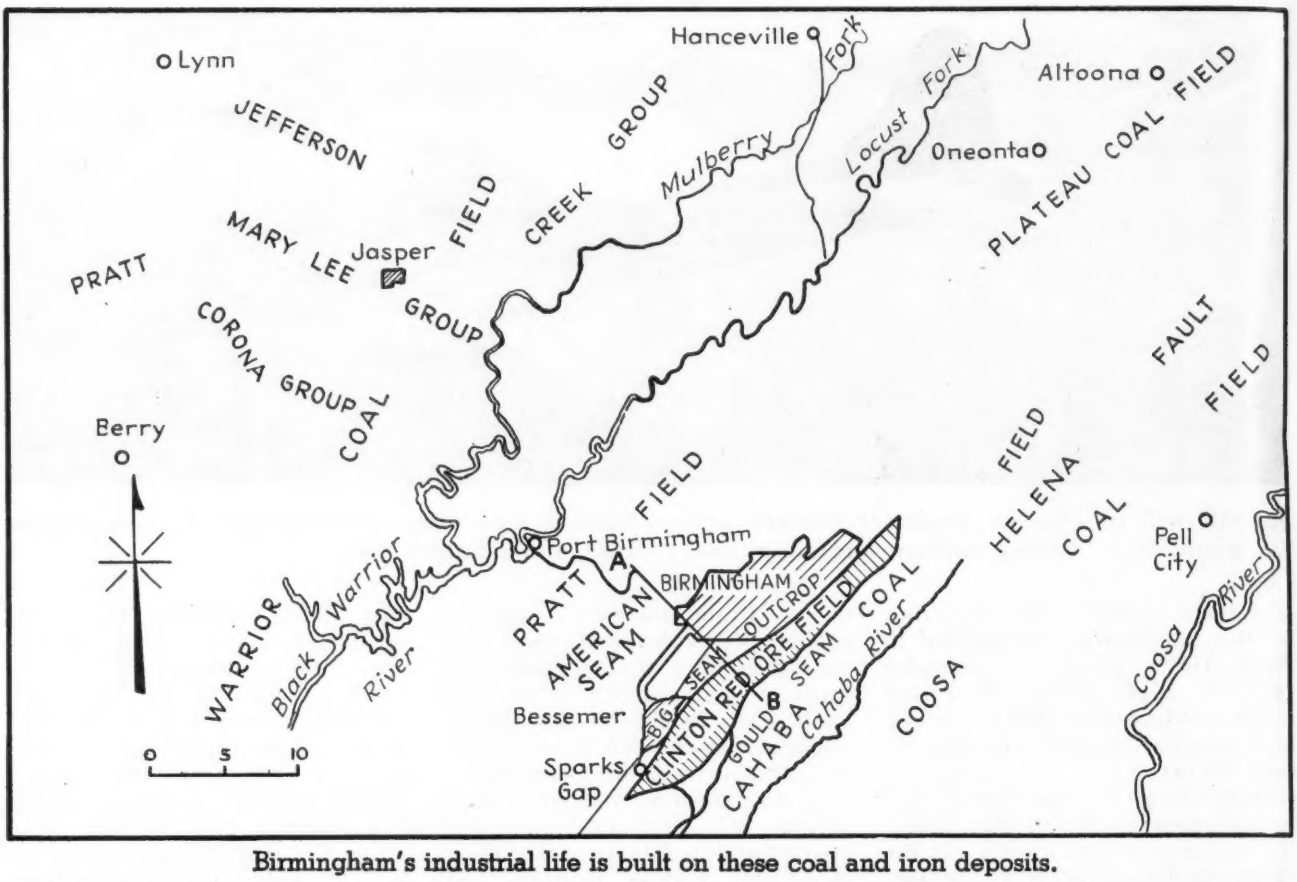
Techniques Improved

An important factor that will influence the use of magnesium products in postwar markets is the greatly increased number of workers who have acquired the "know how" of working with the metal. The knowledge they have gained in handling and fabricating the metal should influence the use of magnesium and its alloys in commercial product. The "know how" of working with magnesium, for example, has brought about a better understanding of the metal's flammability, and has dispelled the opinion that magnesium was dangerous to work with. The increased use of magnesium in war work and the introduction of safe handling techniques have dispelled most of the fire worries.

The price factor will also carry considerable weight in the postwar market. The price of magnesium ingot has declined as markets and production facilities increased. From $5 a pound in 1915, the ingot price fell to 27c. in 1939, and to 20½c. on Jan. 1, 1943. On a weight-for-weight basis, magnesium is more expensive than the other common metals, but on a price per unit of volume basis it has an edge over some of its competitors.

Research and development are under way on new and improved processes and alloys, and marked improvements have been made in casting, forging, extruding, and rolling. Superior resistance to corrosion and improved methods of surface protection have been developed, and progress has been made in welding techniques. The newest and most important development in welding is the "heliarc" process, which eliminates the use of salt fluxes. Because it does not require a welding flux, the "heliarc" process is not limited to butt welds, but may also be used to join parts by lap, fillet, and edge welding. Improved remelting fluxes have also been developed which minimize the loss of metal by oxidation. These have resulted in lower casting costs and offer definite economy to the fabricator whenever it is necessary to melt magnesium.

In order to meet the demands of the war, American Magnesium Corporation undertook a program of expansion, just about completed, costing slightly over $4,000,000. These facilities will all be available for the production of magnesium and alloy parts for civilian use.



Birmingham's industrial life is built on these coal and iron deposits.

Birmingham's Future Depends on Concentration

OSCAR LEE, *Republic Steel Corporation, Cleveland, Ohio*

THE BIRMINGHAM IRON DISTRICT of Alabama is considered to comprise a belt 75 miles long, extending from Vance on the southwest to Springville on the northeast. However, the Clinton formation, in which the red ore occurs, makes a continuous belt to beyond Chattanooga, in Tennessee. No great effort has been made to determine the full extent of the ore resources beyond Trussville, 17 miles northeast of Birmingham. We know, however, that much of the ore in that area occurs in seams that are probably too thin to mine under present conditions. To date, practically all of the red ore consumed in Birmingham has come from a strip 10 miles long between Birmingham and Bessemer. The ore in this zone is largely self-fluxing, or nearly so, with an average analysis of 35 percent Fe, 17 percent CaO, 12 percent SiO_2, 3 percent Al_2O_3, and 0.32 percent P.

The iron occurs as hematite, the lime as carbonate, and the silica as rounded grains of sand, forming the cores of the oölites, which are present in the two types of ore—namely, the fossiliferous and the oölitic. The oölitic ore is made up entirely of grains of sand, ranging in size from $\frac{1}{8}$ in. to −100 mesh, coated with layers of iron oxide, calcium carbonate, finely divided silica, and alumina. These are cemented together with the same materials to form the ore mass. The fossiliferous ore contains a large proportion of fossil remains which have been coated and bound together in the same manner as the grains of sand in the oölitic ore.

Two Beds Mined

Four distinct ore beds occur in the Clinton formation, but ore has been mined from only two of them, the Big Seam and the Irondale. The other two, the Ida and the Hickory Nut,

This paper was prepared by Mr. Lee for the Mining Symposium held Feb. 21, 1944, at the University of Minnesota, Minneapolis, by the Center for Continuation Study. It has not been published elsewhere and is printed here with the permission of Republic Steel Corporation.

Birmingham is known as the "Magic City of the South". It is blessed with an abundance of iron ore, coal, dolomite, and limestone, the bulk of which lies within a radius of 25 miles. It is served by the main lines of six railroads, and by the Black Warrior River, on which barge shipments are made to the Gulf of Mexico at Mobile. Jones Valley, in which the blast furnace and steel plants are located, contains large deposits of limestone and dolomite. Southeast of Red Mountain, in which the Clinton iron-bearing formation occurs, is the Cahaba coal field, and on the northeast side of Jones Valley, is the Warrior coal field.

The first red ore used in the old charcoal furnaces was the soft, leached ore from the outcrop of the Irondale and Big Seam on Red Mountain, but soon after coke proved satisfactory as a blast-furnace fuel, unleached hard ore was also found to be a desirable blast-furnace feed.

Alabama today ranks third among the iron producing states of the country. It mined 9,906,000 tons of iron ore in 1942, and probably as much in 1943. Eighty percent of this was red ore from the Birmingham district.

both contained a good grade of ore, but as these seams average only about 2 to 3 ft. in thickness, they are too thin to be mined economically. The Big Seam is 15 to 22 ft. thick, and the Irondale 3 to 8 ft. The red ore, northeast of the 10-mile strip of slimy ore, becomes siliceous, but, to date, relatively little of this has been mined.

In addition, there are three major beds of ferruginous sandstone above the Big Seam. These beds reach a thickness of as much as 65 ft in places and average about 30 ft. The iron content varies from 21 to 32 percent, and the silica from 45 to 60 percent. A perfected method of concentration will some day create large ore reserves from this class of material, which today is not considered as ore.

The iron ore seams outcrop along the western face of Red Mountain, near its crest, and dip southeast at 15 to 20 degrees. They are remarkably uniform in thickness on the dip. At a distance of 1,500 to 3,000 ft. from the outcrop, the beds begin to flatten out, and in places under Shades Valley the seams are nearly flat. A number of faults occur in the formation, but none of them seriously interferes with mining. Shale partings are found in the Big Seam ranging from $\frac{1}{16}$ in. or less up to a foot or more in thickness, the thicker partings occurring in the limy ores near the southwest extremity of Red Mountain below Bessemer. In the siliceous ore belt, and particularly where the Big Seam reaches the maximum thickness of 20 ft. or more, the shale partings are thin and of little importance. This is fortunate, as the shale has a tendency to break down to slimy fines in wet grinding for concentration and interferes with the normal desliming and iron recovery program.

Future in Siliceous Ores

The future of the Birmingham district depends to a large extent on utilization of the siliceous ores, the tonnage of which is large enough to extend the life of the district for at least 50 years beyond the exhaustion of the self-fluxing ore at the present rate of production. If mining and ore concentration methods are improved to the point where a 20 to 30 percent ferruginous sandstone can be used, the life of Birmingham as an iron and steel center will be prolonged for a great many years more.

Ore Beneficiation

Operators of the district have recognized for some time the ultimate necessity of ore concentration as a means of utilizing the low-grade ore reserves, and for the past ten years they have been investigating its possibilities.

The first attempts to concentrate the Birmingham ores were made as early as 1895, and periodically from then until 1923 various methods of roasting and magnetic separation, electrostatic separation, and gravity separation were tried. Prior to the last war, a small experimental plant was erected for concentrating the siliceous ore by gravity methods, but results were not satisfactory. In 1923, the U. S. Bureau of Mines established an experimental station at Tuscaloosa, Ala., and reopened the study of iron ore beneficiation. The work attracted the interest of the Birmingham operators, and since then rapid strides were made in working out a practical method.

Republic Builds a Plant

In 1936, Republic Steel Corp. started an independent investigation of red iron-ore concentration. Careful consideration was given to roasting and magnetic separation as well as to gravity methods. In the fall of 1940, a 1,000-ton pilot plant was completed and placed in operation at the Spaulding mine, and after two years of operation this was expanded into a 3,000-ton plant in the spring of 1943. The expansion is a Defense Plant Corp. project. Daily output is 1,800 tons of concentrate.

A gravity method of concentration is employed. This involves crushing to $\frac{3}{8}$ in., grinding to −8 mesh, desliming, hydraulic classification, tabling, filtering, and sintering. In arriving at a decision as to the type of plant to use, numerous factors were considered. The most important were grade of product desired, yield, iron and lime recovery, physical character of the product, water requirements including water recovery, tailing disposal, plant cost, and operating cost.

The Ore Is Different

Birmingham red ore is quite different from Lake Superior ores. It is comparatively hard, has a specific gravity of 3.6, and the iron oxide is amorphous. The lime, alumina, and some of the silica is very finely disseminated through the mass that coats and binds the silica grains. Normal grinding methods are not applicable, because the ore slimes easily, and every precaution is used to minimize slimes.

After crushing to $-\frac{3}{8}$ in., the ore is passed over vibrating screens with 8-mesh square openings, the undersize of which goes to bowl classifiers and the oversize to rod mills. These are low-level mills, using light rod loads, and are operated in closed circuits with the screens. The bowl classifier overflows a 150-mesh product, high in iron, and delivers it to two 145-ft. diameter thickeners. The bowl rake product is sent to

eight-cell hydraulic classifiers, where it is classified into eight spigot products and delivered to concentrating tables. Classifier overflow, as in the operation of the bowl overflow, is a finished product and goes to the thickeners.

Diagonal-deck, rubber-covered tables are used. In addition to the concentrate and tailing, a middling is produced that is rescuffed in rod mills for re-treatment on tables in the same manner as the primary ore. The concentrate, after first being dewatered in a rake classifier, is filtered on a small drum-type filter, the cake discharge of which is conveyed directly to the sinter-plant surge bins. The slime, after thickening, is filtered on American-type disk filters and the filter cake is conveyed to separate surge bins at the sintering plant.

Save the Lime

The objective of most concentrating plants is to remove as much gangue material as possible from the ore to improve its grade to a maximum. In the treatment of Birmingham red ores, however, raising the iron content of the concentrate beyond a certain point is accomplished largely at the expense of lime. Inasmuch as lime is essential for fluxing the silica and alumina in the blast furnace, and is already present in the ore delivered to the concentrator, there is no point in grinding finer to increase iron content in the concentrate if it is done through the removal of an excessive amount of lime, which must later be replaced at the blast furnace at a cost. Then, too, the lime present in the sintered concentrate is more efficient as a flux than lime added to the blast furnace in lump form. Therefore, the grinding is limited to −8 mesh and, everything considered, it is felt that the mill product, sintering operation, and costs are better than can be obtained by grinding to finer sizes.

Siliceous red ore varies from 32 to 36 percent iron, 20 to 30 percent silica, 3 to 4 percent alumina, 7 to 12 percent lime (CaO), and 0.25 to 0.38 percent phosphorus. There is a small amount of manganese in the ore, normally about 0.2 percent. The yield of concentrate ranges from 50 to 63 percent, depending on the iron content of the crude ore. The concentrate carries 46 to 48 percent iron, 6 to 8 percent lime, 9 to 11 percent silica, and 3 to 3.8 percent alumina. The table concentrate makes up 60 percent of the total mill product and the remainder is the slime. Though the table product is higher in iron than the slime product, this is compensated for by the higher lime content of the slime.

Ample Working Space

The concentrating plant covers an area of 100 by 290 ft. It was built entirely of concrete and steel, and special attention was given to headroom and working space around the various pieces of equipment. Most concentrators undergo a continuous process of evolution as requirements change, new ideas are developed, or production is increased. With this in mind, more than ample space was provided, and the design of the mill is such that changes or additions to the flowsheet can be made without having to remodel the mill structure or change the main-floor elevations.

The building is well lighted, is heated by the unit heater system, and has modern bath and locker facilities for both men and women. Because of the serious labor shortage, women have been recruited for several of the mill jobs, such as oilers, samplers, and control chemists. They have been found satisfactory for these jobs.

Fresh make-up water is obtained from two wells, 380 ft. deep, and from the mine. A total of about 750 g.p.m. is available, but less than that is used. Water is reclaimed for use in the mill from the thickener overflow and from the tailing pond, and totals about 5,000 g.p.m.

Tailings produced in the pilot section of the mill are pumped to the pond, but this practice is not entirely satisfactory under imposed conditions. The new section of the mill dewaters the tailing down to about 17 per cent moisture and delivers it to the tailing dump over an 850-ft. belt conveyor built in three sections.

The Sintering Plant

A Dwight-Lloyd sintering plant was built for DPC, and adjoins the concentrator. It has 16 windboxes and the pallets are 6 ft. wide. Oil is used for ignition fuel at present, but natural gas facilities are being provided to replace it.

There are eight large storage and surge bins for handling table concentrate, slime, coke breeze, flue dust, and any other type of material that might be used in production of sinter. Standard round-table feeders deliver the materials from the bins to the main feed conveyor at desired rates, with the exception of the slime product, which is fed by a special type of screw feeder developed at the plant. Stationary pug mills are used for mixing the feed and the returns before feeding to the sinter machine.

The sinter made from table concentrate and slime has a good physical structure, and will average over 51 percent iron, 7.5 percent lime, and 13 percent silica. The increase in iron from concentrate to sinter is appreciable and is due of course to the removal of oxygen, CO_2, and combined water in the process of sintering.

Heavy-Media Separation

The self-fluxing red ores, particularly in the southwest area of Red Mountain, have shale partings in places as thick as 18 in. The rock breaks free from the ore in blasting and crushing and the bulk of it is coarser than one-half inch. Heavy-media tests have been made and there is no doubt that iron ores which contain rock in this condition can be considerably improved by means of heavy-density solution methods.

There are no plants of this type in operation in Birmingham today, but the problem is being considered, and it is possible that something will be done with this type of metallurgy before long.

In General

The question that immediately arises in one's mind is that of cost. How can one afford to mine iron ore and throw away 40 percent of its weight in the concentrating process in order to raise the grade from 34 percent iron in the crude ore, to 47 percent in the concentrate, and to 52 percent in the sinter? The answer is in the saving in freight from the sintering plant to the blast furnaces, the increased pig iron production due to a richer burden, the lower coke consumption per ton of pig iron, the lower slag volumes, and the savings resulting from a more uniform burden of sintered material with its faster reducing rate.

The blast-furnace operators of Birmingham have for years produced foundry and basic iron from burdens averaging less than 41 percent iron, and more often under 39 percent. Consequently, high slag volumes and high coke consumption has been the practice. Ore beneficiation, with its promise of 50 percent, or higher, iron burden, is very attractive to these men.

U. S. Conciliation Service Aids the Mining Industry

DR. JOHN R. STEELMAN, *Director U. S. Conciliation Service*

Primary roles played by labor and management in industrial disputes often overshadow the importance of a third party—the labor conciliator. How these neutral arbitrators solve problems of human relations is described in Dr. Steelman's discussion, which also reveals the major causes of disputes and the methods employed to encourage voluntary conciliation. Of particular interest is the case history of a typical dispute which is described from the viewpoint of an impartial participant. Dr. Steelman's article appeals for calmness and fair play in the interest of establishing and maintaining industrial peace.

THE WORK of the U. S. Conciliation Service is based on the simple principle that good industrial relations are essentially a matter of adjusting the human elements involved. These considerations outweigh formal economic issues in the settlement of most labor-management disputes. This statement may surprise those who regard such controversies as primarily a test of economic strength between the employer and his employees.

However, the 30-year record of the Conciliation Service in handling some 70,000 situations shows clearly that mutual understanding is the cornerstone of industrial peace. In settling the vast majority of these situations without any work stoppage, the service relied entirely on voluntary methods of conciliation and arbitration. Moreover, the service does not enter a dispute except at the direct request of representatives of management, labor, or the public.

Individual cases are handled by some 300 Commissioners of Conciliation located in key industrial and commercial centers over the country. The service has been decentralized into five regions with headquarters in New York, Washington, Cleveland, Chicago, and San Francisco. The Regional Directors and their offices are as follows: H. Ross Colwell, Parcel Post Building, 10th Floor, 9th Ave. & 30th St., New York 1, New York. E. P. Marsh, 533 Phelan Building, Market & O'Farrell Sts., San Francisco, Calif. Ewing R. McDonald, 222 W. Adams St., Chicago, Ill. Clarence H. Williams, 10 Forsyth St. Building, Atlanta, Ga. Edward J. Cunningham, 258 Federal Building, Cleveland 14, Ohio. The field work of commissioners is directed from these offices. An administrative staff in Washington coordinates activity.

The Conciliator's Technique

In assigning cases, both the work load in a particular area and the commissioner's familiarity with the industry concerned are given careful consideration. When he takes over a case, the conciliator's first task is to get a clear picture of the whole situation. If it is urgent, he may contact both parties by long distance phone, possibly arranging for a joint conference on his arrival. Commissioners are on call 24 hours a day.

Once he brings the disputants together, preferably in an atmosphere removed from the actual scene of the conflict, the conciliator's real work begins. Tact and good judgment are at a premium here, especially when the controversy has grown bitter and tempers are short. It is essential, too, that commissioners maintain an absolutely impartial attitude. Any display of favoritism would lead to further controversy and destroy whatever framework of confidence and trust the commissioner has built up. This is extremely important, as every member of the Conciliation Service knows.

The record of cases settled is the best commentary that can be offered. Last year commissioners disposed of 15,051 active disputes. Of the cases brought to the service before a strike had occurred, over 95 percent were settled without any work stoppage. Excluding fuels other than coal, the service handled 245 cases among that group of industries engaged in the mining and treatment of metallic ores and nonmetallic minerals; some 609,889 workers were involved. During the eight months' period from July 1, 1943, through Feb. 29, 1944, the service received reports of 38 strikes involving 5,537 workers in this field and found it necessary to certify 28 cases covering 20,875 employees to the National War Labor Board.

Though wages and other matters affecting rates of pay touch off about 70 percent of the disputes that come before the Conciliation Service, disputes also arise over such familiar questions as seniority rights, dismissal policies, working conditions, and collective bargaining itself. The details surrounding each case vary tremendously. In fact, no two are ever exactly alike, but the basic

methods of voluntary conciliation are largely the same.

For a close-up of this process, let us take an actual case in the nonmetallic field. Because these matters are confidential, names and places must be omitted. The locale is a mid-western mining area. The Conciliation Service came into the picture after a mine superintendent wired Washington that negotiations were deadlocked over a question of premium pay for underground work. A commissioner was assigned to the case and had contacted both parties by telephone before the day was over.

A Typical Case

The situation he found on his arrival was this: In expanding its operations the mine had drawn workers from a rather wide area, including several from an adjoining state where wage levels for mining and milling operations were somewhat higher. Moreover, those who had worked underground said that such jobs were scaled 15c. an hour higher than equally skilled or responsible work above ground. That differential was 5c. more than the prevailing premium for underground work in this particular mine.

Word of the better wage scales in Illinois spread among both mine and mill workers, and they determined to do something about it, especially the miners and muckers, who formed the big majority of underground workers. They sent an "Illinois delegation" to talk to the superintendent, who said he had no authority to grant a general wage increase. The best he could do was write to the owners and see how they stood.

When the "Illinois delegation" passed that word to the men underground, they were skeptical, to put it mildly. The super was just passing the buck—trying to give them the run-around. And when the superintendent later reported that the owners wanted time to study the whole question of wage differentials, miners and mill operatives alike refused to believe it. A sharp exchange between a joint delegation and the superintendent ended in threats of a walkout. At that point the Conciliation Service was called in.

The commissioner talked first with the mine superintendent and found him inclined to stand pat—he wasn't going to exceed his authority. The men would just have to wait. Besides, their demands were ridiculous. They had been satisfied until a handful of hotheads stirred them up. If help weren't scarce, he'd fire 'em.

The men were just as firm. Their delegations said the super was stalling—the owners would "study" the thing until the war was over, and then half the miners would be laid off, anyway. It was a frame-up, the men insisted.

Both sides agreed somewhat reluctantly to meet for a joint conference at the town's one hotel that night. The interval was a busy one for the commissioner. He first got in touch with Washington and then called a top official of the company in New York. Following this, he had a hurried session with the mine superintendent.

When the conference opened, the commissioner was able to make this announcement: "The National War Labor Board has just about completed a wage stabilization program for your industry that will cover this whole area—Illinois and Kentucky. So why can't you agree to stand by and work out a contract on the basis of the wage scales set by the War Labor Board in its new program?"

The superintendent was willing, but the men wanted to know how soon the program would be announced and when it would take effect. The commissioner couldn't promise. It might be several weeks.

The miners shook their heads. Suppose it took several months to work the whole thing out?

"Then why not agree right now to make the new scale retroactive?" the commissioner suggested.

It was the superintendent's turn to look doubtful. He wasn't sure of his authority until the commissioner said that he had raised that point with Mr. X in New York, and the company official had said it would be agreeable to him.

When the War Labor Board announced its program a few weeks later, the commissioner was asked by both parties to help them draw up a formal contract. Incidentally, the new agreement included the 13c.-an-hour premium for underground work established by the board.

The point to remember is that this case, as in so many that come before the Conciliation Service, needed only the common-sense suggestions of an impartial third person who knew where to look for the answers. His next case might be totally different, but this principle would still apply.

Technical Assistance

Many disputes involve technical issues that require special handling. The Conciliation Service has a staff of commissioners with technical training who are equipped to make studies and findings of fact upon the joint request of the parties. Such findings are not presented to the parties as final and binding, but rather for their use for further bargaining.

The type of study or finding of fact made by the technical staff, of course, depends upon the question involved. If the problem involves work load, a time study may be made or the incentive plan reviewed. Various other problems may require these technically trained men to assist in preparing job descriptions to be used as the basis of classifying employees or to help the parties with a job evaluation project. Last year the Technical Division extended its work into 35 industries.

Commissioners often suggest technical aid when an agreement has not been reached through conference-table negotiation on particular points of a technical nature. The services of the technical staff may also be requested by writing to the Washington office of the conciliation service.

Arbitrate Upon Request

The service also has a staff of commissioners with specific arbitration training who hear cases and make awards when jointly requested by the parties. This is, of course, voluntary arbitration, as such cases are accepted only when the parties have voluntarily agreed to accept the decision of the arbitrator. During this war period, the wage issues in such awards are subject to review and approval by the National War Labor Board.

During the past year the Service appointed arbitrators in 1,115 cases. These awards were rendered impartially and on the basis of evidence rendered. They were almost all well received by both labor and management, and the wage awards, with only a few exceptions, were unanimously approved by the respective regional War Labor Boards.

This résumé of the U. S. Conciliation Service has deliberately stressed both the voluntary aspect of all the proceedings and the neutral advisory role that commissioners play. Needless to say, this applies with equal force to labor relations in every branch of industry. Though such a presentation omits any rigid formula for industrial peace, it does offer employers and employees a well-tested method for settling their differences—a method which underlines the spirit of freedom and fair play that is the essence of true democracy.

Non-Metallic Minerals in Chile Await Development

FERNANDO BENITEZ, *Mining Engineer, Caja de Credito Minero, Santiago, Chile*

IT MAY BE SAID that in general the ratio of non-metallic to total mineral production of a country can be taken as a rough index of its industrial development. To prove that this is so in the case of the United States, the following table has been compiled.

Year	Percentage of Total Mineral Production Represented by Non-metallic Products—U.S.A.
1880	47.5
1890	50.5
1900	53.6
1910	63.3
1920	75.0
1930	79.3

Chile,[1] like most of the other Latin-American countries, is a producer of raw materials whose industries are in a very early stage of development, comparable to the United States in 1850. Consequently, in Chile the value of non-metallic products is only 30 percent of the total mineral production, even including sodium nitrate, which is all exported and accounts for 85 percent of the value of all non-metallic products.

Although Chile is plentifully endowed with non-metallic mineral deposits, up to the present little has been done to develop them in a proper and systematic way. Notable exceptions to this general rule have been sodium nitrate and iodine, which are found in very large quantities in the pampas of northern Chile. These, the only workable deposits of nitrogen salts known in the world, have been mined continuously and in large tonnages since 1860.

Besides sodium nitrate and iodine, Chile has very large deposits of sulphur; but all of them are located at more than 12,000 ft. altitude near the active or extinct volcanoes of the Andes.

Among the many other known non-metallic mineral deposits in this country, the following are worthy of consideration:

[1] *The author wishes to acknowledge his indebtedness to Senor Tomas Vila's most valuable book "Recursos Minerales No-Metalicos de Chile" for certain of the data contained in this article.*

PROVINCES OF CHILE

Apatite

Los Choros is located 75 miles north of the town of La Serena near the Incahuasi station (Atacama Province) on the Longitudinal Railroad at an average elevation of 5,000 ft. Some twenty different lens-shaped orebodies have been identified in this region that contain apatite mixed with amphibole and magnetite. The probable tonnage of all the known deposits at Los Choros is around 420,000 metric tons. Composite samples of the mines in this region have analyzed in percent: SiO_2, 9.40; P_2O_5, 26.3; CaO, 36.5; Fe_2O_3, 31.1; Al_2O_3, 1.75; Cl, 4.8.

The Cerro Negro deposits are located north of those of Los Choros and are very similar in origin and shape. All occur within areas of andesitic flows; their most probable genesis is by magmatic segregation, and the apatite occurs in amphibole dikes. Grade in $Ca_3(PO_4)_2$ varies between 36.4 and 61.3 percent.

The Los Barros deposits are very similar to those just described, but much larger, having a probable reserve of 540,000 metric tons. They assay: $Ca_3(PO_4)_2$, 49.5; soluble gangue, 9.5—insoluble, 41.0.

The El Pingo deposits are near the railroad station of Domeyko on the Longitudinal Railroad, Atacama Province. Geologically this deposit is similar to the deposits to the south. Probable tonnage is 300,000 metric tons; probable grade in $Ca_3(PO_4)_2$, 70 percent.

Mica

So far no commercial deposits of really first class mica, such as those found in Brazil and the Argentine, have been discovered in Chile. Nevertheless, what seems to be a group of important deposits have been described by F. Kiessling as occurring near the old copper camp of La Higuera in Coquimbo Province. A bronze-colored mica (vermiculite) is found in large dikes within granite, near the contact with porphyries. This class of mica contains 9.41

Current to touch off a blast in the nitrate fields of Maria Elena is obtained by raising a wire transmission line

percent of ferric oxide, by analysis.

J. Felsch has reported on another series of deposits in Bio-Bio Province near the town of Renaico. Here muscovite is found in pegmatite dikes containing quartz and lying within a granite intrusion. According to this report, this muscovite is almost white, transparent, and can easily be split into thin leaves.

Graphite

The most important graphite deposits in Chile are those located 20 miles northeast of the town of Vallenar (Atacama) in the Chequeque Hill. This hill, according to J. Felsch, is made up of a diorite intrusion which has intensely metamorphosed the Mesozoic beds which constitute the hill's western portion. To the west, the diorite is in contact with an amphibole granite of probable Paleozoic age which has intruded beds of gneiss into the Mesozoic sediments. (*Lit-par-lit?*—Ed.)

The graphite-bearing rocks are found only along the contact zone between the diorite and the sedimentary Mesozoic formations, and consist of a series of calcareous slates whose thickness varies between 2 and 2½ ft., with a graphite content of 20 percent. The graphite is thought to be derived from oil or bitumen contained originally in the limestone. Owing to the high temperature reached at the contact zone, the hydrocarbons lost their hydrogen and the carbon crystallized as graphite. Also part of the carbon migrated and crystallized in stratification planes or in fissures in the limestone.

The La Montosa as well as other similar deposits are found near the town of Vallenar, Atacama Province. In this deposit the graphite is found in pockets within silicified limestone beds near a large diorite intrusion. Samples taken from the mines have averaged, in percent: carbon, 59.4; SiO_2, 11.7; $CaCO_3$, 23.4; $Fe_2O_3 + Al_2O_3$, 5.1.

Talc

Chile is plentifully endowed with talc deposits of good quality. The best known are those of Nogales in Central Chile (Aconcagua), within a quartz porphyry. The talc is found in irregular masses up to 45 ft. wide that have a general east-west trend over a distance greater than 3,000 ft.

Other deposits are: Constitucion, 40 kilometres from the port of that name in Maule Province: Llico (Curico), La Florida (Talca), and Corral (Valdivia).

Perhaps the most important of all the known deposits of talc in Chile is that of San Carlos situated 1.5 miles to the west of the port of Corral in Valdivia Province, about 725 ft. above sea level. The mineral has been formed through intense metamorphism of basic rocks (diabasic melaphyres) which occur as beds between the micaceous slates of the Coast Range. The tonnage of commercial talc available in that portion of the bed which has been explored is said to be about 700,000 tons.

Composition of Chilean Talcs

	Constitucion	Llico	LaFlorida	Corral
SiO_2	57.8	54.0	54.5	60.0
MgO	29.7	15.6	27.9	27.7
Fe_2O_3	4.9	4.9	11.6	4.3
Al_2O_3	6.0	16.6	—	3.8
CaO	—	1.1	—	—

Asbestos

There are several deposits of asbestos in Chile, but the amount of development work done has been very slight. One deposit is that of Hualane, in Curico Province about 10 miles from the coast. Asbestos of average quality occurs in fairly large, elastic, white fibers having the following composition, in percent: SiO_2, 56.7; MgO, 18.7; Fe_2O_3, 1.8; Al_2O_3, 1.7; CaO, 12.4; H_2O, 3.3.

At Gorbea and Lastarria, in Cautin Province, asbestos is found in a series of deposits within micaceous slate, a rock which is common in the Coast Range of Chile. This slate has been intruded by a peridotite which is composed of very fine, needle-like crystals of olivine, pyroxene, and amphibole. The asbestos is found in veins which vary from a few millimetres up to 1.5 ft. in thickness and which cross the mother rock in all directions and with all kinds of dips. These deposits have been prospected only to a slight extent. The average composition of this asbestos is: SiO_2, 56.4; CaO, 12.3; MgO, 20.8; Al_2O_3, 2.2; H_2O, 3.4.

At Morro Bonifacio, situated 9 miles north of the port of Corral in Valdivia Province, asbestos is found inside large serpentine areas which in turn are enclosed within slates. The asbestos itself is found in narrow veins which cut the serpentine in all directions. Its color varies from yellowish-white to greenish-white, and the 3-in. fibers are silky to the touch. Although the deposit has not been properly developed it is said to contain more than 150,000 tons of positive ore and the probable and possible reserves may reach several million tons. Its chemical composition is, in percent: SiO_2, 40.0; FeO, 0.21; Fe_2O_3, trace; Al_2O_3, 3.8; CaO, 3.8; MgO, 43.1; Na_2O, 0.15; loss on ignition, 12.8.

Kaolin

Some of the most important productive kaolin deposits of Chile are

found in the hills which extend from Chincolco to Petorca, Aconcagua Province, following more or less the course of the Petorca River. An average partial analysis of these deposits is as follows: Al_2O_3, 31.0; combined SiO_2, 34.0; combined H_2O, 14.2; Fe_2O_3, 1.4; sand, 18.

The Rio Claro deposits, covering about 25 acres, are about 5 miles from the coast in the southern province of Concepcion. Here there is an aplitic granite intrusion almost completely decomposed to an unknown depth. Where the rocks were rich in feldspars, they have been altered into kaolin, which becomes better in grade with depth. A partial analysis of this kaolin follows: Al_2O_3, 36.4; combined SiO_2, 41.5; combined H_2O, 16.5; Fe_2O_3, 1.0; sand, 4.0.

These deposits of kaolin are the source of raw material for the Penco pottery works, the most important in Chile. They are said to contain at least 500,000 tons of good grade kaolin.

Other potentially important deposits of kaolin are those of San Lorenzo and Montenegro, in Aconcagua Province; Donigue (Colchagua); San Javier (Linares); and Lota (Concepcion).

Feldspar

Relatively pure feldspar in commercial quantities is found in pegmatites and granites closely associated with the large granodiorite intrusions which are a conspicuous part of the Coast Range in Chile. The best known of these are at LaCapilla, near Tiltil, Leyda and Malvilla (Santiago), Los Vilos and Tilama (Aconcagua), some between Penco and Concepcion, Calama (Antofagasta), and LaHiguera (Coquimbo).

Barite

The highest grade barite deposits known in Chile are those of Loretito, 8 miles from the Puquios station on the Longitudinal Railroad, Atacama Province. The barite is found in two systems of veins up to 6½ ft. thick running northeast or northwest within a conglomerate. The barite is very pure, and although none of these veins has yet been developed, it is evident that at least 50,000 tons of salable material can easily be mined. Average analysis of this barite is: $BaSO_4$, 96.3; FeO, 0.84; $CaCO_3$, 2.0.

Located 6 miles from the Tres Cruces station on the Longitudinal Railroad, the important La Higuera deposit is being worked, and the barite is ground for domestic use. The deposit is said to be large and analyzes: $BaSO_4$, 96.75; $CaSO_4$, 0.72; FeO, 0.5; Al_2O_3, 0.12; SiO_2, 2.0. Other known deposits are those of Rungue and Montenegro (Santiago), Polcura (Aconcagua) and Tierra Amarilla (Atacama).

Diatomite

The best known deposit of diatomite in Chile is located 3 miles from the port of Arica in Tarapaca Province, near the Peruvian border. This deposit contains over half a million tons of high quality diatomite and has been mined for many years. The diatoms, largely of the genus known as *Navicula*, are all uniform in size and white in color.

The company working the mine has built a small mill for grinding and washing diatomite. The composition of the raw material is: SiO_2, 86.1; Al_2O_3, 1.2; Fe_2O_3, 0.5; CaO, 0.27; MgO, 0.14, moisture, etc. 11.8.

At Mejillones, near the nitrate port of the same name, a deposit has been sampled and appears to be very large.

Close to the San Pedro Volcano in Calama County (Antofagasta Province), where the Chuquicamata copper mine is situated, three fairly large deposits have been found and sampled. These are known as La Tiza, Casa Ceniza, and Casa Blanca. At this place the diatomite is found in post-Tertiary volcanic ash beds. The three deposits are said to contain at least 300,000 metric tons of commercial material. It is mainly composed of *Fragilaria* and is, therefore, a fresh-water lake deposit. The composition is as follows: SiO_2, 76.4 to 88.7; Fe_2O_3, 1.4 to 2.1; Al_2O_3, 2.9 to 6.6.

Potash

Many of the sodium nitrate bearing lands or "pampas," as well as the salt pans of northern Chile, contain potassium salts; however, the low grade of the ore detracts from their usefulness. According to K. V. Arend, the richest potash pampas are those situated north of the Loa River, in the Province of Tarapaca. The grade in these pampas varies between 7 and 2 percent (calculated as KNO_3) and the salt is easily soluble in water. Mr. Arend reports that the important potash mineral is the sulphate.

The Lagunas and Pampa Amaya nitrate lands comprise an area of about 4.5 square kilometers. In these deposits the potash, as sylvite, is found in beds closely associated with common salt and sodium nitrate. These pampas have been sampled by the Superintendencia de Salitre, and according to its figures the area containing potash is 2.2 square kilometers, with an average grade of 2.70 percent K. It is said to contain 8,900,000 metric tons of potash-bearing ground and a fine content of 460,000 tons (as KCl).

Other known salt pans containing potash salts in the desert of northern Chile are those of Llamara, Solar Grande (with an area of 255 square kilometers) and Taltal.

During the years when the Du Pont company was interested in the nitrate deposits of Chile, systematic efforts were made towards the production of potassium nitrate from the Chilean pampas. In 1918, C. M. Barton, at the time vice president of the Du Pont Nitrate Co., declared before a meeting of the American Chemical Society in Wilmington that his company has succeeded in producing potash from the various salts contained in the pampas. At that time, Du Pont was producing some 10,000 metric tons a year of salitre containing 25 percent of KNO_3, the rest being $NaNO_3$. Even then, according to Mr. Barton, only one-third of the potassium contained in the caliche or nitrate ore was being recovered. The same authority estimated that if all the potash contained in the caliches treated was recovered, Chile could produce sufficient potash to supply the needs of the United States, at that time about 720,000 tons per year.

Future of Industry Appears Good

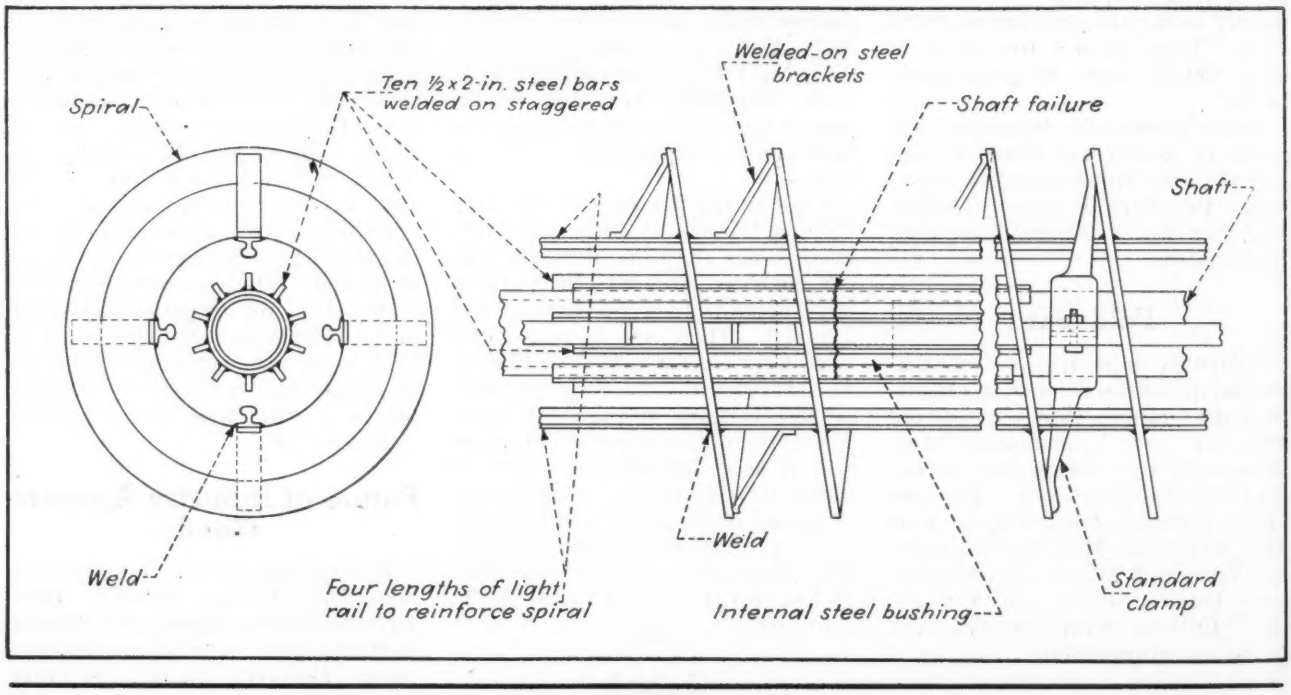
It is difficult to make a forecast of how long Chile's valuable non-metallic mineral deposits will remain in their present more or less dormant state. However, the last few years have seen an accelerated rhythm in the industrial development of Chile, especially with regard to the manufacture of portland cement, pottery, paints, and other industrial products which until recently were all imported. The "Corporacion de Fomento a la Produccion," a government subsidized organization similar to the Reconstruction Finance Corporation, has undertaken a well planned and ambitious program for tapping a large part of the latent hydroelectric resources of Chile within the most favorable industrial zones. Once cheap power is available in large amounts, there is not the least doubt that the industrial development of the country will grow at a much faster rate and that many of our non-metallic resources will find a favorable market in Chile.

OPERATING IDEAS

Classifier Shaft Repair Averts Lengthy Shutdown

AT THE FLOTATION MILL of the United States Smelting, Refining & Mining Co. at Bayard, N. M., the hollow shaft supporting the spiral of a 60-in. classifier broke. Because of absence of a spare shaft, a long shutdown was in prospect unless the broken unit could be repaired quickly. The shaft was made up of two lengths of steel pipe, with an internal steel bushing in the center of the shaft. The unit was repaired in the shop as shown in the accompanying sketch.

After the old bushing had been removed and the shaft ends ground, a new bushing was pressed halfway into one pipe end. The other pipe end was then pushed over the protruding bushing, and the resultant seam was welded. Ten ½x2-in. steel bars were welded on the exterior of the shaft in a staggered manner for reinforcement as shown. As the steel bars precluded the use of standard clamps, four short light rails were welded on the inner rim of the spiral. Steel brackets were then welded on the flanges of the rails to support the spiral. The repaired shaft, which has been in operation for several months, has shown no weakness thus far.

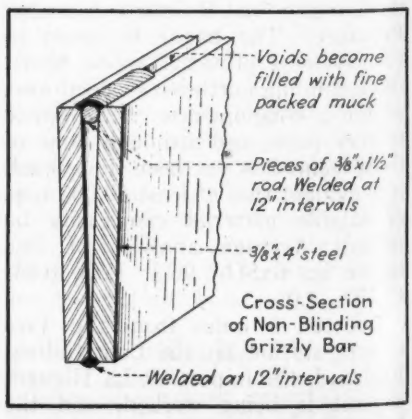


Non-Blinding Grizzly Bar Easily Built

FABRICATED NON-BLINDING BARS, such as the one here illustrated, were used by Paul T. Barnes, of Henderson, Nev., to construct a sloping grizzly which effectively screened the feed to a secondary crusher. Oversize ran from ¾ in. to 8 in., and undersize was minus ¾ in.

The bars were constructed of two lengths of ⅜x4-in. steel spot-welded together at 12-in. intervals along the bottom, and several ⅜x1½-in. rods which were inserted along the top and welded into position as shown. Forging or machining similar wedge-shaped bars would have been more costly and would have required more steel.

After the bars have been installed, the voids soon fill up with fine muck and thus offer considerable protection against abrasion and impact. However, if wear does ensue, the bar surfaces can be built up with abrasion-resistant rod. Because of the voids, approximately 50 percent less welding is required to resurface fabricated bars than for solid bars of similar size. The fabricated bars are also lighter and easier to handle.

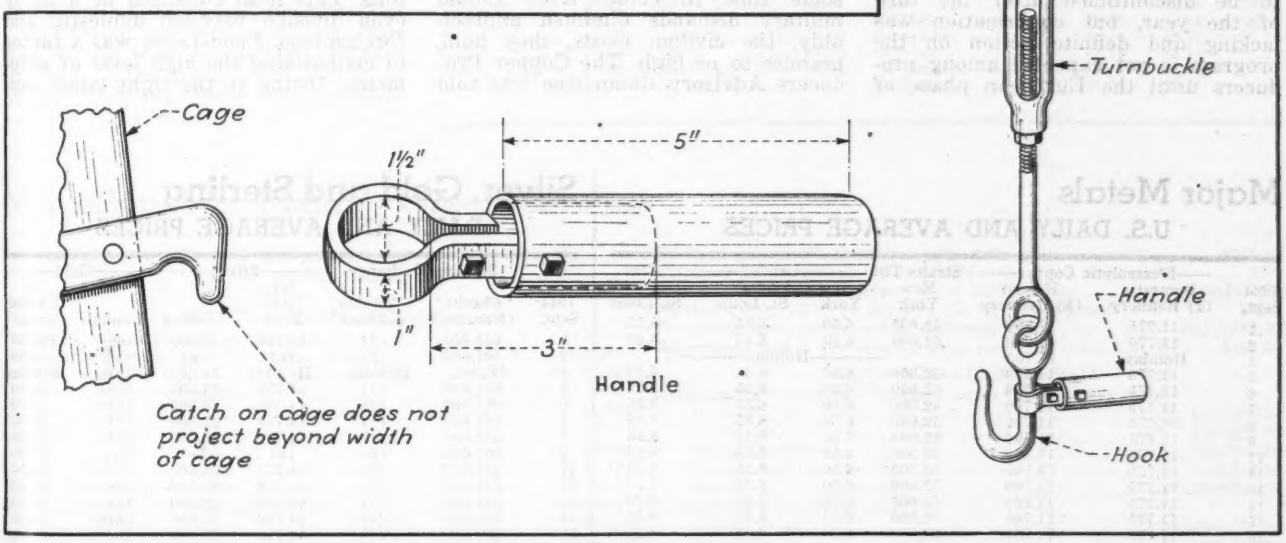

Voids become filled with fine packed muck
Pieces of ⅜"x1½" rod. Welded at 12" intervals
⅜"x4" steel
Cross-Section of Non-Blinding Grizzly Bar
Welded at 12" intervals

Shaft Cages Landed With Hook and Catch

DEPENDABLE, QUICK-ACTING SAFE LOCKS or landing mechanisms are necessary installations at shaft stations where cages are used. They may vary in design from elaborate retractable landing chairs to simple hooks which can be manually engaged with catches on cages. A device of the latter type has served satisfactorily at the plant of Anaconda Copper Mining Co. at Butte, Mont., and is illustrated in the accompanying sketch.

The lever-like lock bar attached to the steel bracket on the shaft timber is made up of two steel eyebolts, a sturdy turnbuckle, and the hook proper. To hasten attachment of the hook to the catch on the cage and prevent possible injury to fingers and hands, the hook is provided with the simple handle shown. It consists of a steel clamp to which a short piece of rubber hose is bolted.

Catches are installed on the sides of the cage and do not project beyond the width of the cage. Operation is simple and quick. As soon as the cage has reached a desired point on the shaft station, the operator grasps the handle of the hook and attaches the hook to the cage catch. The hoistman then slacks off slightly on the hoisting cable.



Suspended Clamp Handles Bulky Parts

Unwieldy machine parts like the one shown here are easily handled in the plant of Harnischfeger Corp., Milwaukee, Wis., by means of a heavy-duty C-clamp fitted with a ring.

Dollars for Drawings

Engineers, metallurgists, miners, millmen, mechanics—why not browse through your files of shop drawings and select a few devices you have improvised to solve some tough operating problem? Accompany the drawing with a brief description and an account of your success in applying the idea so that other workers in your field may profit by your experience. E.&M.J. pays $5 for each idea published.

MARKET SUMMARY

STOCKPILE LEGISLATION, removing the threat of dumping of Government-owned surpluses of minerals and metals for a period of 15 months after enactment of the law, was passed by Congress during September. This action was accepted in market circles as a favorable development, but it exerted no influence on the immediate situation, because pressure of excess production has not yet become a problem. The war economy, in one way or another, continues to support the general price structure. Cutbacks in production, so far, have been confined almost entirely to the light metals. There were rumors that the premium price plan on domestic production of copper, lead, and zinc is to be discontinued after the turn of the year, but confirmation was lacking and definite action on the program is not expected among producers until the European phase of the war, at least, has been concluded.

The Foreign Economic Administration announced that after the defeat of Germany it will be possible to cut back its foreign procurement program for strategic and critical materials. However, it was revealed that the adjustment to a reduced program will be made in such a way as to prevent unnecessary financial losses to American taxpayers and to best preserve our foreign relations. FEA already has cut back on purchases of tungsten ore and quicksilver, and has served notice on Bolivian producers of the first-named item that it will cease buying after Dec. 31, 1944.

WPB officials look forward to a high level of copper consumption for some time to come. Even should military demands diminish appreciably, the civilian needs, they hold, promise to be high. The Copper Producers Advisory Committee was told that copper requirements in the first quarter after V-E day may total about 379,000 tons, of which military and essential civilian products would take fully 281,000 tons and other civilian needs 98,000 tons. This large total would call for either continued heavy importations or a reduction in the stockpile. During the first eight months of 1944, fabricators consumed an average of 140,413 tons of refined copper per month. Peak consumption was 160,335 tons in April, and the low for the Jan.-Aug. period was 118,632 tons in July, the vacation month. During August consumption was estimated at 138,285 tons.

Lead requirements were large during September, involving around 80,000 tons. This total consisted of a fairly even division between domestic and foreign lead. Lend-Lease was a factor in maintaining the high level of shipments. Owing to the tight labor sup-

Major Metals

U.S. DAILY AND AVERAGE PRICES

1944 Sept.	Electrolytic Copper: Domestic (a) Refinery	Electrolytic Copper: Export (b) Refinery	Straits Tin New York	Lead: New York	Lead: St. Louis	Zinc St. Louis
1	11.775	11.700	52.000	6.50	6.35	8.25
2	11.775	11.700	52.000	6.50	6.35	8.25
4	Holiday	11.700		Holiday		
5	11.775	11.700	52.000	6.50	6.35	8.25
6	11.775	11.700	52.000	6.50	6.35	8.25
7	11.775	11.700	52.000	6.50	6.35	8.25
8	11.775	11.700	52.000	6.50	6.35	8.25
9	11.775	11.700	52.000	6.50	6.35	8.25
11	11.775	11.700	52.000	6.50	6.35	8.25
12	11.775	11.700	52.000	6.50	6.35	8.25
13	11.775	11.700	52.000	6.50	6.35	8.25
14	11.775	11.700	52.000	6.50	6.35	8.25
15	11.775	11.700	52.000	6.50	6.35	8.25
16	11.775	11.700	52.000	6.50	6.35	8.25
18	11.775	11.700	52.000	6.50	6.35	8.25
19	11.775	11.700	52.000	6.50	6.35	8.25
20	11.775	11.700	52.000	6.50	6.35	8.25
21	11.775	11.700	52.000	6.50	6.35	8.25
22	11.775	11.700	52.000	6.50	6.35	8.25
23	11.775	11.700	52.000	6.50	6.35	8.25
25	11.775	11.700	52.000	6.50	6.35	8.25
26	11.775	11.700	52.000	6.50	6.35	8.25
27	11.775	11.700	52.000	6.50	6.35	8.25
28	11.775	11.700	52.000	6.50	6.35	8.25
29	11.775	11.700	52.000	6.50	6.35	8.25
30	11.775	11.700	52.000	6.50	6.35	8.25
		AVERAGES FOR MONTH				
Sept.	11.775	11.700	52.000	6.50	6.35	8.25
Sept.		AVERAGES FOR WEEK				
6	11.775	11.700	52.000	6.50	6.35	8.25
13	11.775	11.700	52.000	6.50	6.35	8.25
20	11.775	11.700	52.000	6.50	6.35	8.25
27	11.775	11.700	52.000	6.50	6.35	8.25
Sept.		CALENDAR WEEK AVERAGES				
2	11.775	11.700	52.000	6.50	6.35	8.25
9	11.775	11.700	52.000	6.50	6.35	8.25
16	11.775	11.700	52.000	6.50	6.35	8.25
23	11.775	11.700	52.000	6.50	6.35	8.25
30	11.775	11.700	52.000	6.50	6.35	8.25

THE above quotations for major non-ferrous metals are our appraisal of the important United States markets, based on sales reported by producers and agencies. They are reduced to the basis of cash, New York or St. Louis, as noted. All prices are in cents per pound.

(a) Net prices at refineries on Atlantic seaboard. To arrive at the delivered New England basis add 0.225c. per pound, the average differential for freight and delivery charges.

(b) Export prices are net at refine 'es on the Atlantic seaboard and include sales of domestic copper in the foreign market. Owing to the World War and the disruption of normal trade relations, our export copper quotations, since September, 1939, have been based largely on f.a.s. transactions, ex United States ports. We deduct .05c. from the f.a.s. basis (lighterage, etc.) to arrive at the f.o.b. refinery quotation.

Copper, lead and zinc quotations are based on sales for both prompt and future deliveries; tin quotations are for prompt delivery only.

Quotations for copper are for the ordinary forms of wirebars and ingot bars; cathodes are sold at a discount of 0.125c.

Quotations for zinc are for ordinary Prime Western brands. Zinc in New York commands a premium over the St. Louis basis equal to the freight differential. Contract prices for High Grade zinc delivered in the East and Middle West in nearly all instances command a premium of 1c. per pound over the current market for Prime Western but not less than 1c. over the *Engineering and Mining Journal's* average quotation for Prime Western for the previous month.

Quotations for lead reflect prices obtained for common lead, and do not include grades on which a premium is asked.

(c) Silver other than newly-mined domestic, by Handy & Harman. Under Treasury order of July 6, 1939, the price on domestic newly-mined silver mined subsequent to July 1, 1939, was fixed at 71.11c. per troy ounce. Handy & Harman's quotations on newly-mined domestic silver, 999 fine was 70⅝c. throughout September.

(d) U. S. Treasury's gold price. Actual payment by the United States Treasury for gold in domestic and imported ore or concentrate is at 99.75 per cent of the price quoted by the Treasury, which is equal to $34.9125.

Silver, Gold and Sterling

DAILY AND AVERAGE PRICES

1944 Sept.	Sterling Exchange: "Checks" (Nominal)	Sterling Exchange: "90-day demand"	Silver: (c) New York	Silver: London	Gold: London	Gold: (d) United States
1	401.000	(f)	44.750	23.500	168s.	$35.00
2	401.000	(f)	(e)	(e)	(e)	35.00
4	Holiday	Holiday	Holiday	23.500	168s.	Holiday
5	401.000	(f)	44.750	23.500	168s.	35.00
6	401.000	(f)	44.750	23.500	168s.	35.00
7	401.000	(f)	44.750	23.500	168s.	35.00
8	401.000	(f)	44.750	23.500	168s.	35.00
9	401.000	(f)	(e)	(e)	(e)	35.00
11	401.000	(f)	44.750	23.500	168s.	35.00
12	401.000	(f)	44.750	23.500	168s.	35.00
13	401.000	(f)	44.750	23.500	168s.	35.00
14	401.000	(f)	44.750	23.500	168s.	35.00
15	401.000	(f)	44.750	23.500	168s.	35.00
16	401.000	(f)	(e)	(e)	(e)	35.00
18	401.000	(f)	44.750	23.500	168s.	35.00
19	401.000	(f)	44.750	23.500	168s.	35.00
20	401.000	(f)	44.750	23.500	168s.	35.00
21	401.000	(f)	44.750	23.500	168s.	35.00
22	401.000	(f)	44.750	23.500	168s.	35.00
23	401.000	(f)	(e)	(e)	(e)	35.00
25	401.000	(f)	44.750	23.500	168s.	35.00
26	401.000	(f)	44.750	23.500	168s.	35.00
27	401.000	(f)	44.750	23.500	168s.	35.00
28	401.000	(f)	44.750	23.500	168s.	35.00
29	401.000	(f)	44.750	23.500	168s.	35.00
30	401.000	(f)	(e)	(e)	(e)	35.00
			AVERAGES PER MONTH			
Sept.	401.000	..	44.750	23.500	..	35.00
			AVERAGES PER WEEK			
6	401.000	..	44.750	..	..	
13	401.000	..	44.750	..	..	
20	401.000	..	44.750	..	..	
27	401.000	..	44.750	..	..	

Calendar week averages, New York Silver: Sept. 2nd, 44.750; 9th, 44.750; 16th, 44.750; 23rd, 44.750; 30th, 44.750.

(e) Not quoted (Saturday). (f) No quotation.

ply at the mines, domestic output has been a source of disappointment to producers. Production of refined lead from domestic ore has averaged around 34,000 tons a month in the summer period. The Government's stockpile of foreign lead has been reduced to about 158,000 tons.

To expand domestic consumption of zinc in civilian channels, WPB has modified its controls in a number of instances. Use of monthly allocation certificates has been discontinued. Before the industry can hope for a real gain in civilian consumption of zinc, restrictions on steel and copper will have to be eased, producers maintain.

Bolivian producers of tin concentrates have been negotiating for a higher price than 60c. for tin contained, f.o.b. South American ports, on sales to the United States, but as September ended no decision had been reached. The selling basis for Grade A tin here continues at 52c. per pound.

Quicksilver prices held to a fairly even course on reports that production continued below current consumption.

Aluminum production during June was 66,400 tons, against 76,450 tons in May, WPB reports. The drop in output resulted from Government-ordered curtailments.

Miscellaneous Metals Monthly Averages

Average prices of miscellaneous metals for August and September.

(a) New York, packed in cases, in lots of 5 tons or more but less than a carload. (b) Nominal. (c) Producer's price for commercial sticks. (d) Average producers' and platers' quotations, (e) Special shapes sold to platers.

	Aug.	Sept.
Quicksilver, N. Y. flask	104.037	104.280
Antimony (a)	15.839	15.839
Antimony, bulk, Laredo	14.500	14.500
Antimony, bulk, N. Y.	15.265	15.265
Antimony, Chinese (b)	16.500	16.500
Platinum, oz. troy	35.000	35.000
Cadmium (c)	90.000	90.000
Cadmium (d)	92.500	92.500
Cadmium (e)	95.000	95.000
Aluminum ingot	15.000	15.000

E & M J Price Index

Weighted index of non-ferrous metal prices (copper, lead, zinc, tin, silver, nickel, and aluminum). The average for the years 1922-1923-1924 equals 100.

1929	110.33	1936	73.45
1930	82.87	1937	90.86
1931	60.20	1938	73.67
1932	48.26	1939	77.71
1933	59.79	1940	79.22
1934	69.59	1941	83.49
1935	74.66	1942	86.80
1043	88.74		

	1942	1943	1944
January	85.39	88.74	88.74
February	85.90	88.74	88.74
March	85.90	88.74	88.74
April	85.90	88.74	88.74
May	85.90	88.74	88.74
June	85.90	88.74	88.74
July	85.90	88.74	88.74
August	85.90	88.74	88.74
September	88.74	88.74	88.74
October	88.74	88.74	....
November	88.74	88.74	....
December	88.74	88.74	....

Miscellaneous Metals, Ores, Minerals

Quotations cover wholesale lots, prompt shipment, f.o.b. New York, unless otherwise stated

(Oct. 2, 1944)

MISCELLANEOUS METALS

Aluminum, ingot, 99 plus per cent, lb.	15c.
Antimony, domestic, spot, lb. 5 tons or more	15.839c.
Bismuth, ton lots, lb.	$1.25
Cadmium, commercial sticks, lb.	90c.
Calcium, lb., ton lots, 97 @ 98 per cent	$1.25
Chromium, 97 per cent grade, lb.	89c.
Cobalt, 97 to 99 per cent, per lb.	$1.50
Indium, troy oz.	$7.50
Nickel, electrolytic cathodes, lb.	35c.
Magnesium, 99.8 per cent, carloads, lb.	20½c.
Palladium, troy oz.	$24.00
Platinum (Official quotation) troy oz.	$35.00
Quicksilver, flask of 76 lb., 100 flasks or more	$105.00
Selenium, 99.5 per cent, lb.	$1.75
Silicon, minimum 97 per cent, spot, carloads, lb.	14.75c.
Tellurium, lb.	$1.75
Thallium, 100 lb. or more, lb.	$12.50 nom.
Titanium, 96 to 98 per cent, lb.	$5.00

METALLIC ORES

Beryllium Ore, 8 to 12% BeO, f.o.b. mine, per unit	$14.50
Chrome Ore, per long ton, f.o.b. cars Atl. ports, dry, 48% Cr_2O_3, 2.8 to 1 ratio	$41.00
48% Cr_2O_3 3 to 1 ratio	$43.50
Iron Ore, Lake Superior, Lower Lake ports, long ton:	
Old Range bessemer	$4.75
Mesabi bessemer	$4.60
Old Range non-bessemer	$4.60
Mesabi, non-bessemer	$4.45
Lead (Galena) 80 per cent, Joplin, Mo., ton	$76.01
Manganese, Metals Reserve Co. sales price, per long-ton unit of Mn contained, 48 per cent, subject to premiums and penalties, effective May 15, 1944: 85c. (duty paid) New York, Philadelphia, Baltimore, Norfolk, Mobile, and New Orleans; 91c., Fontana, Calif., Provo, Utah, and Pueblo, Colo.	
Molybdenum Ore, 90%, per lb. of MoS_2 f.o.b. mines	45c.
Tungsten Ore, per unit of WO_3:	
Chinese, 60 per cent, duty paid	$24.00
Domestic, 60 per cent and upward	$24.00@$25.00
Vanadium Ore, per lb. of contained V_2O_5 f.o.b. mines	27½c.
Zinc Ore, Prime, 60 per cent concentrate, Joplin, Mo.; per ton	$55.28

(a) Prices at mines, small lots, normally several dollars less.

METALLIC COMPOUNDS

Arsenic Oxide (arsenic) lb.	4c.
Cobalt Oxide, 70 @ 71 per cent, lb.	$1.84
Copper Sulphate, 100 lb.	$5.00

ALLOYS

Beryllium Copper, 2.5 to 3 per cent Be, per lb. of contained Be	$15.00
Ferrochrome, 65 @ 70 per cent per pounds of Cr. contained	13c.
Ferromanganese, 78 @ 82 per cent, gross ton	$135.00
Ferromolybdenum, 55 @ 65 per cent Mo, lb. of Mo. contained	95c.
Ferrosilicon, 50 per cent, per lb. of contained Si	6.60@8.10c.
Ferrotungsten, 75 @ 80 per cent, lb. of W contained	$1.90
Ferrovanadium, per lb. of V, delivered	$2.70@$2.90
Silicomanganese, 1 per cent C, gross ton	$133.00

NON-METALLIC MINERALS

Asbestos, f.o.b. Canadian (Quebec) mines (U.S. funds), ton:	
Crude No. 1	$650@$758
Crude No. 2	$165@$385
Spinning fibers	$124@$233
Paper stock	$44@$49.50
Shorts	$14.50@$26.50
Vermont, f.o.b. Hyde Park:	
Shingle stock	$62.50@$65.00
Paper stock	$44.00@$53.00
Shorts	$14.50@$28.50
Floats	$19.50
Barytes, long ton:	
Georgia, crude	$8.50@$9.00
Missouri, 93 to 94 per cent Ba SO_4	$8.85@$8.50
Bauxite, long ton:	
Domestic, crude, 50 @ 52 per cent (not dried)	$5.00
Domestic, chemical, 55 @ 58 per cent	$7.50@$8.50
Domestic, abrasive, 80 @ 84 per cent	$16.00
China Clay, f.o.b. mines, ton:	
South Carolina and Georgia, No. 1, bulk	$6.75@$8.00
Delaware, No. 1	$15.00
Feldspar, bulk, ton:	
Potash feldspar, 200 mesh	$17.00
Glass spar, white, 20 mesh	$11.75
Fluorspar, f.o.b. mines, bulk, Kentucky and Illinois 60 per cent, all rail movement, ton	$30.00
Acid 98 and 1 per cent, bulk, ton	$37.00
Fuller's earth, f.o.b. Georgia or Florida, ton	$7.00@$14.00
Magnesite, per ton dead-burned, f.o.b. Washington	$22.00
Mica — Colonial Mica Corp., agent for Metals Reserve Co., offered to buy No. 1 and No. 2 domestic sheet mica, 1½ and 2 in. and larger, full trim, at $8 per pound from Aug. 7 to Dec. 31, 1944. Those who wish to sell on a three-quarter trim basis will obtain $6 per pound, as previously stated.	
Ocher, Georgia, ton	$19.00@$22.00
Pyrites, Spanish, per long ton unit of s, c i f, Atlantic ports	12c. nom.
Silica, in bags, 325 mesh, ton	$20.00@$40.00
Sulphur, Texas, mines, long ton	$16.00
Talc, f.o.b. works, ton:	
New York, double air-floated, 325 mesh	$12.00@$15.00
Vermont, extra white, 200 mesh	$9.50@$10.50
Tripoli, Missouri, ton:	
40 mesh, cream colored	$14.50
200 mesh, cream colored	$26.00

IRON AND STEEL

Pig Iron, Valley furnaces, gross ton: Basic	$23.50
Steel, base price, Pittsburgh Billets, gross ton	$34.00
Structural shapes, 100 lb.	$2.10

WASHINGTON REFLECTIONS

McGRAW-HILL WASHINGTON NEWS BUREAU

Surplus Property Bill Includes Stockpiling

After a three weeks' battle between Senate and House viewpoints, the conferees handling the Surplus Property bill finally reported out a compromise bill on Sept. 15. This was quickly taken up and passed by both houses, despite general realization that the bill was a hodgepodge, which satisfied nobody—certainly not the House nor the Surplus War Property Administration. However, it was accepted because members of Congress were anxious to get home for electioneering, but were chary of facing the voters without having taken some action on surplus property disposal.

Even before the bill became law, Will Clayton, Surplus War Property Administrator, declared his unwillingness to administer the Act. His belief was that the law would not lend itself to sound, businesslike administration, and that surplus property disposal was destined to become a plaything for politicians. Inasmuch as many of Clayton's staff agreed, it seemed likely that there would be a thorough revamping of top personnel in the SWPA.

Clayton's objections seemed based on two main considerations. First, the creation of a three-man board is bound to promote dissension and delay, particularly because a bloc-minded Senate will insist on diverse interests being represented. Second, a considerable number of surplus plants would actually be worth very little in comparison to their cost, and the provisions for delay and Congressional review of major sales would allow politics and sectionalism to confuse real issues in the public mind, and discourage many logical bidders from participation because of unwillingness to become involved in muckraking controversies.

The law provides that each agency now owning or controlling government property "shall have the duty and responsibility continuously to survey the property in its control and to determine which of such property is surplus to its needs and responsibilities." The only qualification placed upon the authority of owning agencies to exercise their discretion in declaring property to be surplus is that "Whenever in the course of the performance of its duties under this Act, the Board has reason to believe that any owning agency has property in its control which is surplus to its needs and responsibilities and which it has not reported as such, the Board shall promptly report that fact to the Senate and House of Representatives."

The law retains much of the policy on mineral stockpiling embraced in the Senate bill (*E.&M.J.*, Sept., p. 96). Section 22 (text on p. 120) specifies a list of "strategic" minerals, even including magnesium, which, upon being declared surplus by the owning agencies within a 12- to 15-month period, are to be transferred to Treasury Procurement and become subject to the stockpile Act of June 7, 1939, as amended. The amounts to be transferred are limited to exclude present war requirements, plus a six-month supply for non-war industry, as estimated by the War Production Board. The Army and Navy Munitions Board is authorized to add other minerals to the "strategic" list.

The owning agencies and Treasury Procurement are authorized to put the stockpiled minerals "into forms best suited for storage and use for the common defense." This probably means that much of the large zinc concentrate stockpile will be smelted and that the low-grade accumulations of chrome and manganese will be beneficiated, if stockpiled.

The Army and Navy Munitions Board is given three months to submit a list of maximum and minimum amounts of each mineral which it deems proper to hold in the permanent stockpile. Congress then has one year to legislate further on "strategic" minerals. Unless Congress provides otherwise, after that year the Surplus War Property Board is authorized to attend to the disposal of "strategic" minerals when they are determined to be surplus under the terms of the Act.

Any surpluses which are transferred to Treasury Procurement during the 12- to 15-month interim will become as securely locked away from the markets as can be done by law. Section 4 of the Act of June 7, 1939, reads as follows: "Materials acquired under this Act except for rotation to prevent deterioration shall be used only upon the order of the President in time of war, or where he shall find that a national emergency exists with respect to national defense as a consequence of the threat of war."

An effort to insert a section in the bill which would have required the Secretary of the Interior, when disposing of surplus lands, to withhold the mineral rights was vigorously opposed by Washington representatives of the mining industry. This section was removed before the bill was reported out by the conference committee. The legislation as it was finally passed contains the provision that the board shall classify surplus real property as agricultural, grazing, forest, mineral, or otherwise as it may deem advisable. There is no further reference to the disposal of mineral lands.

The stockpile provisions were the subject of controversy throughout the legislative course of the bill, and undoubtedly Section 22 would have been much more limited, or would have been eliminated entirely, were it not for intensive spadework by the American Mining Congress.

The effect of Section 22 will depend largely on the amounts of mineral, metal, ores, scrap, etc., which are declared surplus by the owning agencies in the 12- to 15-month period. Conceivably, with war still going on, very little may be declared surplus and stockpiled except off-grade material which was bought for political appeasement or to bolster market-grade production. Any low-grade material will presumably be beneficiated, if possible. However, if this is not feasible, there will be no way of exchanging it for high-grade, if it is declared surplus and goes to Treasury Procurement. The Act of June 7, 1939, provides for rotation only to prevent deterioration. On the other hand, if the war ends during the period, or its likely needs diminish sharply, large mineral inventories may go into a permanent stockpile. What relationship they may bear to the logical needs of a future emergency is anybody's guess at the present time.

Congress recessed until election time immediately after passing the bill. However, press reports stated that Western senators are dissatisfied with the compromise achieved and will open a drive for more extensive stockpiling.

Colmer Committee Against Subsidizing Mine Output

On Sept. 11 the House Special Committee in Postwar Economic Policy and Planning issued a noteworthy report on "Economic Problems of the Reconversion Period." The 18-man committee, chairmanned by Representative William M. Colmer of Mississippi, is doing an unusually sincere and painstaking job. Marion B. Folsom, an Eastman Kodak executive who has distinguished himself by various special services to government during the war, was persuaded to become staff director and is assisted by a group of able economists. Many readers will want to obtain the 69-page report in full, as it undoubtedly is an important guidepost to future economic policy.

With reference to taxation, the committee anticipates a postwar federal budget of nearly $20 billion per year, after reviewing probable charges for military needs, veteran care, and debt service. This is estimated as adding up to a tax charge (direct and indirect) or more than $550 per year on the average family of four, which, added to estimated state taxes of $350, will amount to $900 per family per year. The committee concludes that "The implications should be obvious, unless we can attain

higher levels of productive capacity than in any previous peacetime period, the burden of necessary taxation may prove intolerable."

The committee also states that a substantial foreign trade is an essential part of continued prosperity and urges the removal or reduction of various types of international trade restrictions (including protective tariffs), currency manipulations, and trade discriminations.

With reference to mining, the committee states:

"No segment of the economy has been more profoundly disturbed by the demands of global warfare than that of mineral production. The urgent war need for critical materials required a manifold expansion of output in ferrous and nonferrous minerals, including petroleum. Erstwhile critical shortages have been converted into adequate war supplies and what will be postwar surpluses. These extractive industries now face a painful and, in some cases, potentially ruinous readjustment to the peacetime volume of demand.

"In these circumstances, the committee recognizes the seriousness of the problem of reestablishing the mining and petroleum industries on a sound postwar basis. The reasonable needs of the armed forces for postwar security should be realistically determined first. The surplus accruing after those security requirements have been met should become available on a disposal schedule so timed as to permit the industry to return to a peacetime basis in an orderly manner. It is not, however, the province of the national government to support the continuance of submarginal mines which cannot meet the competition of the normal peacetime market."

WLB Criticised for Night-Shift Decision

The War Labor Board decision reversing the Nonferrous Metals Commission award for general wage increases in several Western mines where night shifts exist, but establishing actual night-shift differentials (*E. & M.J.* Sept., pp. 62 & 99), was the subject of criticism from industry members of WLB in late September. With the United Steel Workers (CIO) making demands for night-shift differentials, these members insisted that the decision constituted an attempt to establish a new employment practice, notwithstanding a declared policy against using war emergency powers to create innovations in employment practices. Chairman Davis defended the decision on the dubious grounds that it applied to substantially an entire industry and thus did not create competitive disadvantages between employers.

Unfortunately, WLB did not reverse the Commission on another case involving Miami Copper, International Smelting & Refining, and Inspiration Consolidated operations at Miami and Inspiration, Ariz., involving a raise in minimum wages to avoid alleged racial discrimination. In this case the Commission made a finding of racial discrimination against Spanish-Americans and Mexicans simply because they occupied the lower-pay jobs and had no representation beyond a certain level. From a neutral position the decision looked like an effort to start an upward wage movement in an area where a general advance seemed unjustifiable, by upsetting wage differentials at the bottom of the scale. This can be expected to provoke a series of disputes over differentials, which can then be settled by separate upward revisions to restore normal differentials.

Belgian Zinc Smelters Believed to Be Intact

The current understanding is that the German retirement from northern France and Belgium was so precipitate that the enemy had little opportunity to damage coal mines, utilities, and smelters in that area. The Belgian smelters are understood to be substantially intact, but not well supplied with concentrates. Representatives of reoccupied countries point out that the cheapest and soundest way to aid their rehabilitation is to assist them in getting their industries in operation. Thus, some individuals anticipate that there may be a call for zinc from the Metals Reserve stockpile. However, sources closest to the situation believe that any such needs are more likely to be supplied from outside sources, such as Canada and Argentina.

FEA has not renewed contracts for foreign zinc concentrates beyond the end of this year. Some parties who believe that we will continue to be dependent on importations for approximately 40 percent of our requirements think that it is unwise to cut the foreign producers adrift.

WPB Declares Policy of Minimum Control

After the turmoil which resulted in loss of WPB's top command of Donald Nelson and Charles Wilson, the agency rapidly settled down under its new chairman, J. A. Krug, initiating a new policy aimed at minimum control by government over reconversion.

Some opinion portrayed Krug as a New Deal "tool," but this seemed manifestly unjust. Nothing in Krug's record or attitude indicates him to be anything but a straightforward, businesslike administrator, interested primarily in getting a good job done and not characterized by political leanings, New Deal or otherwise.

At any rate, Krug's athletic bulk had scarcely made the top chair in WPB comfortably warm when he proclaimed a policy on reconversion which sounded like the antithesis of New Dealism. Completely overstriding the mincing steps which WPB had previously taken toward reconversion, the new program was aimed at the most thoroughgoing relaxation of material and industrial controls consistent with war needs.

As part of the new program, WPB announced that gold mines closed by Order L-208 would be permitted to make such purchases of materials and equipment as are necessary to make ready for immediate operation when X-day arrives. The announcement virtually stated that L-208 would be revoked on X-day.

Krug announced appointment of Arthur H. Bunker as "chief of staff" plus continuance of the latter's status as deputy executive vice chairman and staff director of the production executive committee. This announcement apparently scotched the rumor that Bunker planned to resign from WPB. Krug also appointed Hiland C. Batcheller, former member of WPB, as chief of operations.

Available evidence indicated that the Army and Navy, which had persistently hindered Nelson's moves toward reconversion, had had a sudden change of heart. Such a quick change could only mean that the armed forces had heard from the Commander in Chief.

Bill to Permit Sale of Gold and Silver Abroad

Identical bills "to permit the sale in foreign markets of newly mined gold or silver produced within the United States, its territories and possessions, including Alaska, and which may be surplus to the war effort," were introduced in both houses of Congress on the first of September. The policy clauses expound the argument for permitting the mining industry to take advantage of the high prices of gold and silver abroad. Paragraph "g" describes the situation in the following language:

"As due to this scarcity, gold and silver are selling in some countries at prices greatly above the present domestic prices, as for example the Indian government today is selling in the Bombay market South African gold at approximately $58 per fine ounce and silver lend-leased to India by the United States Treasury, at prices ranging from $1 to $1.09 per fine ounce."

Inquiry as to what would happen if this bill were to be passed indicates that the stated purposes would not be accomplished at the present time. Sales in India or in Egypt, where the price is comparable to that in India, would be made under the sterling area rules, which are such that money derived from the sale of gold could not be converted into dollars nor could it be used to buy any commodity for export. The fact is that it would be impossible to get the money out.

Despite the fact that the bill, if passed, will accomplish little to benefit gold and silver producers at present, it may be of some value in the future, and is a step toward cutting the web of legal restraints which hamper free traffic in gold.

NEWS OF THE INDUSTRY

Introduce Senate Bill To Revise S.E.C. Act

Senator Arthur Vandenberg, of Michigan, introduced legislation on Sept. 19 amending Sec. 3b of the Securities Exchange Act to enable the Commission to exempt public offerings of $300,000 or less, instead of $100,000, the top figure now imposed by that section of the act.

A week previous to the introduction of Senator Vandenberg's legislation, Ganson Purcell, chairman of SEC, commented, "If it should be deemed by Congress to be a sound policy to relax the registration provisions of the act in an effort to stimulate the flow of capital into small business enterprises, we believe it be preferable to do so by raising to $300,000 the exemption provided . . . rather than by relaxing the disclosure requirements generally."

Chinese Expert Speaks On Mineral Resources

Dr. Chung Yu Wang, technical expert for the Ministry of Economic Affairs for China, discussed the geology and economic aspects of the mineral resources of China in an address to the New York Section, A.I.M.E., at the Mining Club, New York City, on Sept. 19.

Speaking in terms of postwar needs, Dr. Wang indicated that China has abundant reserves of bauxite, tungsten, and antimony; sufficiencies of coal, iron, and manganese; exportable amounts of tin and mercury; a deficiency of copper; and "exceedingly poor" reserves of lead, zinc, gold, and silver. The accompanying table lists figures which he gave to show a comparison of China's resources with respect to those of U.S.A. and Russia.

Percent of World Reserves*

	Coal	Iron	Petrol.	Cu.	Baux.	Mn.
China	11.4	2.2	4.7	2.6	24.4	3.8
U.S.A.	45.4	11	64.3	26	3.5	1.4
Russia	17.3	15	8.7	6.5	−1	61.5
Total	74.1	28.2	77.7	35.1	28.9	66.7

* Based on latest available figures.

To illustrate Chinese production costs, Dr. Wang mentioned that in 1937 China produced tungsten ore and laid it down in New York for $7 per unit, 65 percent WO_3. An import duty of $8 brought the price to $15, which was still below the approximate prevailing price of $16. During the same year antimony was produced in China and laid down in New York for approximately 10c. per pound. The import duty at that time was 2c. per pound and the average price about 15c. Low costs in each case were due to cheap labor in China.

He stated that Dr. H. H. Kung, Minister of Finance, welcomes foreign capital, but that business and government would be organized as "partners" in enterprise. He felt certain that the Chinese government would frame its laws so as to attract capital by guaranteeing security and permitting ample returns on investment. He outlined the following "four freedoms of investment" which capital could justly expect: 1. Location—freedom to put a plant anywhere; 2. Management—including freedom to employ labor; 3. Distribution—implying the right to sell anywhere; and 4. Exchange—as yet uncertain because of unpredictable future developments.

Gold Standard Attacked By British Statesman

The Bretton Woods monetary plan was termed "a racket" by Robert Boothby, member of Parliament and chairman of the Monetary Parliamentary Policy Committee, who addressed a conference called to oppose any return of Great Britain to the gold standard, according to a Reuter's dispatch on Sept. 23.

The conference was called to demand that Parliament reject the Bretton Woods monetary plan as unconstitutional, and to demand a full public inquiry into alternative world trading systems which are based on a goods standard and not a gold standard.

Mr. Boothby urged reconstruction of the sterling area wherein interdependent nations could pursue common economic policies. He contended that the credit policy of the proposed sterling area should maintain confidence in sterling and keep its value stable in terms of commodities. He advocated the revital of reciprocal trade agreements to facilitate exchange of goods between countries having complementary rather than competitive economic structures.

Soviet Writer Endorses World Gold Standard

Prof. Z. B. Atlas, a Soviet writer, advocated in a recent issue of the Russian periodical "Bolshevist," that the world re-adopt a gold standard.

"Trade cannot be conducted without money," he wrote "neither within a country nor on a world scale. And no other world currency except gold has yet been invented."

Professor Atlas agreed with the principles proposed at Bretton Woods by Harry D. White, assistant to the Secretary of the Treasury, and commended the experts who accepted these principles in drawing up the United Nations plan for the world currency fund. He criticized the plan of Lord Keynes, which excluded gold exchange and proposed endless credits.

In reviewing financial history after the first World War, he pointed out that Great Britain had lost its position as a world clearing house, that the postwar crisis has weakened the world financial structure and the gold standard, and that the practise of "currency dumping" by countries with falling valuta had turned the currency problem from a national internal problem into an acute world problem.

Postwar German Control Proposed by Engineers

The presidents of five national engineering societies in a joint statement on Sept. 29 advocated the postwar devitalization of Germany's war industries, but opposed the "indiscriminate destruction" of peacetime industries which would be essential to the future welfare of the world. The statement was made in protest to Secretary of the Treasury Morganthau's recently announced plan to virtually destroy all of Germany's industrial plant; and was signed by Malcom Pirnie, American Society of Civil Engineers; Chester A. Fulton, American Institute of Mining and Metallurgical Engineers; Robert M. Gates, American Society of Mechanical Engineers; Charles A. Powel, American Institute of Electrical Engineers; and Dr. George G. Brown, American Institute of Chemical Engineers.

The following measures were proposed to destroy Germany's war-making capacity:

1. Eliminate all synthetic oil capacity and prohibit the reconstruction of plants and the importation of oil beyond normal peacetime inventories.

2. Eliminate 75 percent of Germany's synthetic nitrogen plant capacity and prohibit reconstruction of plants and all importation of nitrogen compounds.

3. Eliminate 50 percent of Germany's steel-making capacity in those categories of plants which are most capable of producing essential war materials such as heavy forgings and high-alloy steels. Also prohibit the importation of iron ore, flux material, steel and steel products beyond normal peacetime inventories.

4. Eliminate aircraft plants and equipment. Prohibit the importation of bauxite, and limit the importation of aluminum ingots to prewar peacetime needs.

In a concluding statement the presidents asserted that they were opposed "to any plan which would make postwar Germany a drag on the economy of all Europe, if not of the world, and a breeder of future wars."

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Congress Passes Surplus Property Bill Putting Interim Surpluses in Stockpile

The Surplus Property Bill, which was revised by compromise agreement and incorporates a section dealing with stockpiling of surplus strategic minerals and metals, was passed by the House on Sept. 18 and by the Senate on Sept. 19.

A complete transcript of Section 22 of the Surplus Property Bill follows:

Sec. 22. (a) All Government-owned accumulations of strategic minerals and metals, including those owned by any Government corporation, shall be transferred by the owning agency, when determined to be surplus pursuant to this Act, to the account of the Treasury Procurement Division and shall be added to the stockpile authorized by the Act of June 7, 1939 (53 Stat. 811), as amended, and shall be subject to its provisions: Provided, That contractor inventory shall be so transferred only when the owning agency has taken possession of and determined such inventory to be surplus. The minerals and metals may be transferred in any form in which they are held, but the owning agency or the Treasury Procurement Division is authorized either before or after such legal transfer to cause such minerals or metals to be put into forms best suited for storage and use for the common defense. As used in this section the phrase "strategic minerals and metals" means copper, lead, zinc, tin, magnesium, manganese, chromite, nickel, molybdenum, tungsten, mercury, mica, quartz crystals, industrial diamonds, cadmium, fluorspar, cobalt, tantalite, antimony, vanadium, platinum, beryl, graphite (and to which may be added aluminum or any other minerals or metals in such quantities or amounts as the Army and Navy Munitions Board may determine to be necessary for the stockpile authorized by the Act of June 7, 1939), and shall include ores, concentrates, alloys, scrap, and partially and completely fabricated articles of which the principal components by value consist of such minerals and metals, but shall not include such fabricated articles as the Army and Navy determine are not suitable for their use in the form in which fabricated and which may be disposed of commercially at values substantially in excess of the metal market price of the component minerals and metals of such fabricated articles.

(b) Pending a determination by the War Production Board that the Supplies of the respective strategic minerals and metals available to industry are sufficient to meet the current requirements of industry, the owning agency subject to the regulations prescribed by the Surplus Property Board shall withhold from transfer under this section an amount of such minerals and metals equal to the deficiency, if any, estimated by the War Production Board as likely to exist for the requirements of industry for a period of six months for purposes other than war production; and may dispose of the minerals and metals so withheld to the extent necessary to meet any such deficiency actually found to exist by the War Production Board, at the market price of the respective minerals and metals.

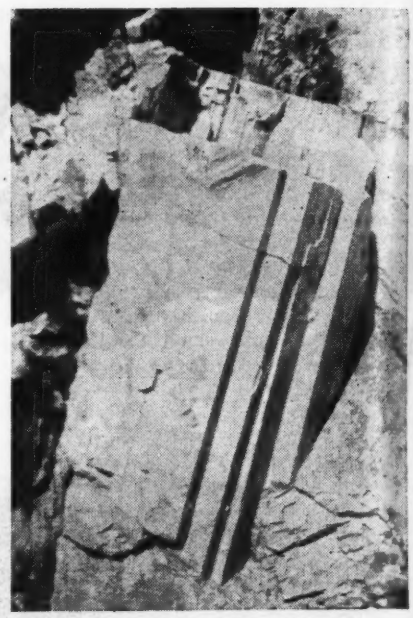
(c) Any Government-owned accumulations of strategic materials shall at the request of the War and Navy Departments be transferred by the owning agency, when determined to be surplus pursuant to this Act, to the account of the Treasury Procurement Division and shall be added to the stockpile authorized by the Act of June 7, 1939 (53 Stat. 811), as amended, and shall be subject to its provisions. The materials may be transferred in any form in which they are held and they shall thereafter be put into forms best suited for storage and use for the common defense. The term "strategic materials" as used in this subsection means all materials except strategic minerals and metals as defined in subsection (a) of this section and includes all materials in group A or in group B of the list of strategic and critical materials determined upon by the Army and Navy Munitions Board on March 6, 1944, as amended from time to time, but shall not include any of such materials which the Army and Navy determine do not meet the specifications suitable for common defense or are in excess of the needs thereof. The Army and Navy Munitions Board is authorized to direct the removal from the list of any of the materials as defined in this subsection, in which event they shall be disposed of under the provisions of this Act.

(d) Within three months following the enactment of this Act the Army and Navy Munitions Board shall submit to Congress its recommendations respecting the maximum and minimum amounts of each strategic mineral or metal which in its opinion should be held in the stockpile authorized by the Act of June 7, 1939. After one year from the submission of such recommendations, unless the Congress provides otherwise by law, the Board may authorize the proper disposal agencies to dispose of any Government-owned accumulations of strategic minerals and metals including those owned by any Government corporation when determined to be surplus pursuant to this Act.

Five-Ton Beryl Crystal Mined at S. D. Property

Famous for its production of large beryl crystals, the Highland Lode mine, 7 miles west of Custer, S. D., yielded a 5½-ton crystal in April 1944. In 1940 a 7-ton crystal was uncovered, and numerous crystals weighing one or two tons each have been found.

Formerly the property of the Westinghouse Electric & Manufacturing Co., which worked it for sheet mica, the Highland Lode is now operated by John Ross. No record is available of the quantity or quality of production under Westinghouse direction, but subsequent production has amounted to 9,500 tons of feldspar, 343 tons of scrap mica, 79½ tons of beryl, 137 lb. of columbite, and some condenser sheet mica, according to H. H. Stewart, Inspector of Mines, Deadwood, S. D.



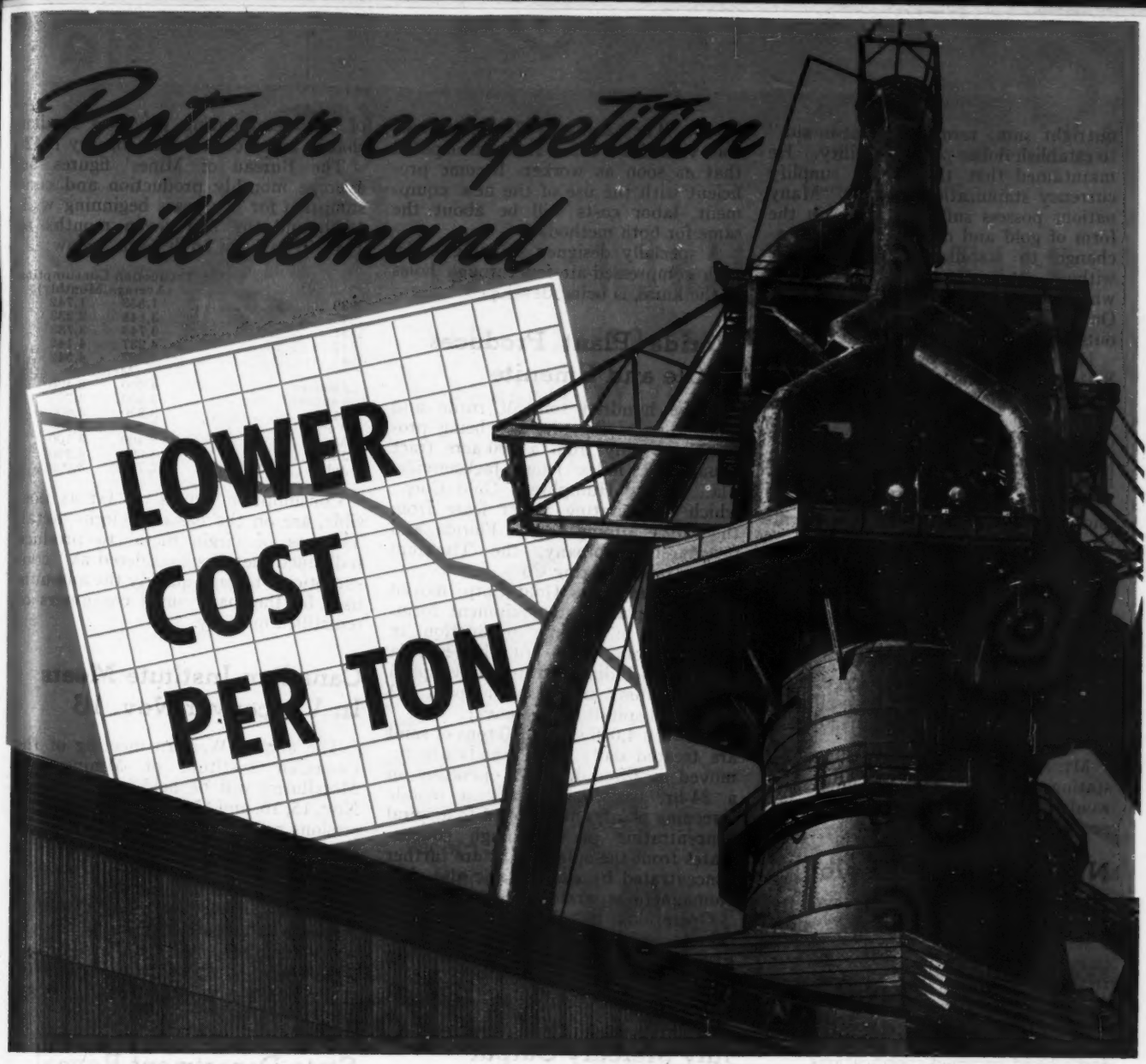
Green beryl crystal found in John Ross' Highland Lode mine, near Custer, S. D. The crystal was 8 ft. long, 42 in. in diameter at one end and 32 in. at the other. Weight 5½ tons. Sold for $992.

Approximately 75 ft. of the top of the dike in which the minerals occur has been removed by quarrying. An inclined shaft, sunk in 1940, opens a level 50 ft. below the surface. Here the minerals are found in the same zones as on the surface. The beryl crystals are not as large as those described in the foregoing, but they are more numerous; and the quality of the mica and feldspar is better than in the surface workings.

Bretton Woods Plan Opposed by Mr. Aldrich

Winthrop W. Aldrich, president of Chase National Bank of New York, suggested a currency plan to replace the Bretton Woods proposals at a meeting of the Executives Club of Chicago on Sept. 15. Stating that the Bretton Woods recommendations served as obstacles to immediate solution of basic economic problems, Mr. Aldrich urged the removal of trade barriers and the stabilization of the dollar-pound rates as initial steps in establishing favorable world economic relations.

Mr. Aldrich advocated that United States contribute to Great Britain an



WHILE the wartime objective of the Iron and Steel Industry has been, and still is, the production of maximum tonnage, future competition will put the accent on lower production costs.

This new objective will call for replacement, modernization or repair of existing blast furnaces and steel plants and the addition of modern facilities for proper preparation of raw materials, both ore and coal.

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outright sum, termed "grant-in-aid," to establish dollar-pound stability. He maintained that this would simplify currency stabilization, stating "Many nations possess sufficient assets in the form of gold and dollar or sterling exchange to stabilize their currencies without external financial aid—a fact which seems to be widely overlooked. Only a few nations will have to seek outside financial assistance."

He urged leadership of the United States in removing trade barriers and in "lifting from international economy the burden of intergovernmental war debts." In recommending internal policy for Americans, he said it would be necessary to establish a currency "in which other nations can have confidence and in terms of which they will be willing to conduct their trade.

"The road back to sound currencies is difficult economically," he predicted, "and seldom popular politically. We must be willing to repeal all silver purchase legislation, to repeal the Thomas Amendment of 1933, and to repeal Sections 8 and 9 of the Gold Reserve Act of 1934, which allow buying and selling of gold to differ from the gold content of the dollar."

Mr. Aldrich concluded his address by stating that currency manipulation would not solve the basic economic problems of a war-ridden world.

N. C. Workers Employ Bandsaw to Trim Mica

Rifted mica has been successfully trimmed with a bandsaw in preliminary trials at Spruce Pine, N.C. Experienced mica workers in that locality state that the saw-cut mica lots are as satisfactory as those cut according to India hand-trimmed specifications.

Saw trimming results in less waste than hand trimming. By way of comparison, two 20-lb. lots of mica were rifted from the same block by the same worker. One lot was trimmed by hand, the other with a bandsaw. The hand-trimmed lot produced 5 lb. of strategic mica, and the saw-trimmed lot produced 7½ lb. The saving of 2½ lb. of mica was valued at $15. It is anticipated that as soon as workers become proficient with the use of the new equipment, labor costs will be about the same for both methods.

A specially designed splitting knife, with compressed-air fed through holes in the knife, is being developed.

Florida Plant Produces Rutile and Ilmenite

Three hundred tons of rutile and 2,000 tons of ilmenite are being produced monthly from a 500-acre tract situated 8 miles from Jacksonville, Fla., by the Humphreys Gold Corp., which is operating under lease from the Rutile Mining Co., of Florida, and its parent company, the Titanium Alloy Manufacturing Co.

The Humphreys Gold Corp. moved its entire plant and equipment formerly used in chrome production in Coos County, Ore., to the Florida location, including 30 Humphreys spiral concentrators, and also shipped 192 additional spirals from Denver.

Between 4,000 and 5,000 tons of sand are treated daily. The sands are removed by three draglines operating on a 24-hr. basis, cleaned in a mobile screening plant, and pumped to a spiral concentrating plant. Rough concentrates from the spiral plant are further concentrated by electrostatic and electromagnetic separators.

Operations of the property were taken over by the Humphreys organization on April 1, 1944. Zircon, which is also present in the deposit, is being produced on an experimental basis.

July Mercury Output Drops to 2,700 Flasks

Mercury production during July totaled 2,700 flasks, according to the Bureau of Mines, the smallest monthly output since April 1940. Consumption also was on a reduced basis, but exceeded production by 300 flasks. Use of the metal during July was smaller than in any month since February 1942.

The Bureau of Mines' figures on average monthly production and consumption for five years beginning with 1939, and the first seven months of 1944, in flasks of 76 lb. each, follow:

	Production	Consumption
	(Average Monthly)	
1939	1,553	1,742
1940	3,148	2,233
1941	3,743	3,733
1942	4,237	4,142
1943	4,327	4,542
	(Monthly)	
January	4,400	3,400
February	3,800	3,700
March	3,800	3,600
April	3,700	3,200
May	3,400	3,100
June	3,000	3,400
July	2,700	3,000

Consumption figures, so far as possible, are on the basis of virgin metal. The use of virgin metal to produce redistilled metal is considered as "consumption" to gage quickly the amounts used by the many small consumers of redistilled mercury.

Canadian Institute Meets In Vancouver Nov. 15

The annual Western meeting of the Canadian Institute of Mining and Metallurgy will be held in Vancouver Nov. 15, 16, and 17. Contemporaneous sessions will be held to make provisions for the large number of topics and papers. A joint session will be held with the British Columbia chapter, American Society for Metals. Other sessions and symposiums will be devoted to mining methods, milling and metallurgy, prospecting and exploration, conservation and salvage, geology, and metal-marketing problems.

State Department Reveals Postwar Tin-Buying Policy

In discussions with Bolivian authorities in connection with the purchase of tin concentrates, the State Department let it be known that it is not interested in extending government-to-government commodity contracts, and private business is expected to resume buying strategic materials when the war is over. The Bolivians, according to Washington advices, have asked that the base price be raised from 60c. to 66c. per pound of contained tin, f.o.b. South American ports.

U. S. Agencies Disclose Oregon Alumina Deposit

A large high-alumina clay deposit occurs in Clackamas County, Ore., about 30 miles south of Portland. This deposit was investigated jointly by USGS, USBM, and the Department of the Interior in 1942 and 1943. Seventy-seven holes totaling 7,964.5 ft. were drilled and indicated clay reserves exceeding 30 million dry tons of measured ore, with 25.7 percent of available alumina, 7.7 percent available iron.

Copper Production and Consumption

(American Bureau of Metal Statistics)

Total supply of refined copper to American industry in the first half of 1944 was 902,800 tons, according to the War Production Board. The expected total for the year is 1,750,000 tons, which may be compared with the total of 1,802,000 tons reported by the American Bureau of Metal Statistics for 1943. The proportion of domestic new production entering into the supply is shown in the following table, the difference being the derivation from old material and from imports, chiefly the latter. Figures are in tons.

	1944 Jan.-June	Average Per Month	1944 July
Total supply of refined copper	902,800	150,500	138,200
United States mine production	528,900	88,100	80,400
Difference	373,900	62,400	57,800
Deliveries to:			
Copper and brass mills	569,900	95,000	72,800
Wire and cable mills	229,100	38,200	35,300
Foundries (a)	51,500	8,600	7,300
Uncontrolled (non CMP)	38,000	6,300	4,400
Totals	888,500	148,100	119,800
Shipments in ingot brass (a)	215,400	35,900	33,400

(a) Deliveries to foundries include shipments of copper to manufacturers of ingot brass, wherefore the shipments accredited to the latter through their own statistics are duplicational to some extent.

Mo-lyb-den-um is the "miracle mineral," used in making steel alloys of exceptional hardness, toughness and wear-resistance. A "Magic Mountain" in the Rocky Mountains of Colorado, provides the mo-lyb-den-um for Wood's own special analysis Mo-lyb-den-um alloy steel used exclusively in Moly shovels, spades and scoops.

Moly Shovels are normally made in all types, styles and grades needed for every variety of industrial use. Learn to know Moly, unconditionally guaranteed to outwear and out-last any other shovel made.

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MO-LYB-DEN-UM ALLOY SHOVELS

PERSONAL NEWS

D. V. Schmidt, formerly of Boulder, Colo., is general manager of the mill of the Ore Processing Co., at Silver City, N. M.

Alfred "Al" McIsaac is in charge of the St. Eugene Mining Corp.'s prospecting party in the Tweedsmuir Park area of British Columbia.

Edwin K. Smith has, at the request of the Chinese government, been appointed by the State Department to go to China as a metallurgical specialist to serve with the Chinese National Resources Commission.

Thomas L. Joseph, professor of metallurgy of the Minnesota School of Mines and Metallurgy, has been appointed acting administrative assistant in the school, succeeding **Elting H. Comstock.**

Robert Crooks Stanley, Chairman and president of International Nickel Company of Canada, Ltd., will receive the A.S.M. Medal for the Advancement of Research during the annual dinner of the American Society for Metals on Thursday evening, Oct. 19, at Cleveland.

Phil J. Shenon, regional director in Spokane of the U. S. Geological Survey, has been assigned by the Army to take charge of geological work in the South Pacific.

E. H. Mangan, for two years superintendent in Spokane of the Electro-Metallurgical Co., has been transferred to a new post in the company's New York offices. He is being succeeded in Spokane by **George Griffin,** who has been his assistant for the last year.

Merle H. Guise, who has been at San Marino, Calif., recently completed a trip through Nevada, where he reports considerable new interest in gold lodes and placers in hope of an early resumption of gold mining.

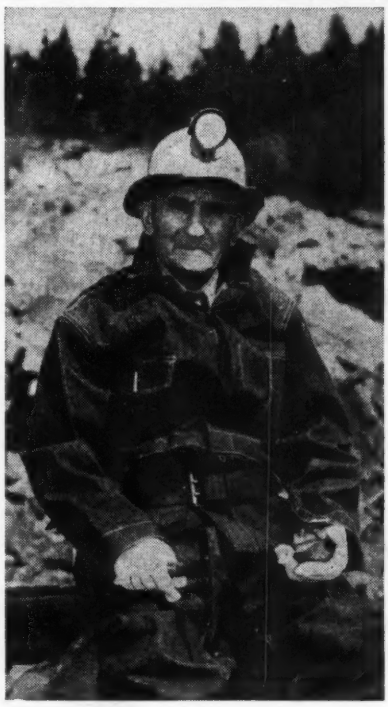
Harry J. Wolf, recently with the iridium section of the zinc division of WPB, is now acting as a lead specialist to the metals division of the foreign and development branch of the FEA at Washington, D. C.

W. G. Findlay, sectional manager at Randfontein Estates, has been appointed general manager of the Consolidated Murchison (Transvaal) Goldfields & Development Co.

C. DeWitt Smith recently left Washington, D. C., to accept the commission of ensign in the U. S. Naval Reserve. For two years he had been on the staff of the copper section of the Metals and Minerals Division of the BEW and with FEA.

U. B. Gilroy, civil and mining engineer of San Francisco, who has been a prominent placer operator in California for some years past, spent some time in British Columbia last summer in search of placer-gold deposits of merit.

Walter C. Burchett, sole surviving member of the group of four which staked the Sullivan mine, near Kimberley, B. C., in 1892, recently revisited



WALTER C. BURCHETT

the property for the first time and was photographed at the site of the outcrop discovered 52 years ago. Photographed by Charles Warmington, Kimberley, B. C.

Theodore Pilger has returned to his offices at 771 Stamford Ave., Palo Alto, Calif., after an examination near Gardiner, Mont.

J. M. Bowlby, president of Eagle-Picher Lead Co., has assumed the duties of general manger of the company, also, following the retirement of **George W. Potter,** director, executive vice president, and general manager, recently announced. Mr. Bowlby has announced appointment of **R. L. Hallows** as technical assistant to the president and production manager of the pigment division of the company. **Hallows'** most recent assignment was as superintendent of smelters of the subsidiary.

Felix Vogel, an engineer of the Silver City branch office of the U. S. Bureau of Mines, has been engaged in field work in the Cimarron and Elizabethtown districts in Colfax County, N. M.

Arthur Jahn, mill superintendent of the Mayflower mill, at Silverton, Colo., has resigned to accept a position with a mining company in Missouri. He has been succeeded by **H. D. Bemis,** who formerly operated properties at Pecos and Glorietta, N. M.

Curtis Sundeen, a mining engineer with Cleveland-Cliffs Iron Co. since 1940, has been promoted to assistant superintendent of the Athens mine, at Negaunee, Mich.

A. D. Falck, Jr., geologist, until recently on the staff of Anaconda Copper Mining Co., at Butte, Mont., has severed his association with Anaconda. He remains vice president of the Mike House Mining Co., Helena, Mont., and expects to continue development and consulting work.

Henry Hughes, of Cooley, Minn., is personnel director for Butler Brothers' Mesabi Range iron mines. He succeeds **Phillip Eldred.**

H. V. Smitheringale, after four years' service in the R.C.A.F., has re-entered the mining industry as a member of the staff of Leta Explorations, Ltd.

Henry L. Hill is in charge of the exploration program of Minto Gold Mines, Ltd. He has been granted leave of absence from Bralorne's exploration department to undertake the work.

J. S. McIntosh, of Sheep Creek Gold Mines, Ltd., is in charge of the exploration program at the Parridice mine, in British Columbia.

Arthur G. Langley has been prospecting in the Whitesail Lake district on behalf of International Mining Corporation (Canada) Ltd.

Kenneth Carmichael, field engineer for Conwest Exploration, will direct the exploration program for the N'Kana Group at Yellowknife, N.W.T. A geological survey of the property was recently made by **B. S. W. Buffam,** consulting geologist, Toronto.

Genevieve Harvey, sister of the late Frederic Hall Harvey, mining engineer and authority on hydraulic mining, has presented to the California Debris Commission her brother's books and notes pertaining to hydraulic mining.

Alvin M. Cummings, mining engineer, formerly in charge of the Bureau of Mines experimental plant for mining and milling manganese ores at Chamberlain, S. D., is now general manager of International Talc-Corp., Gouverneur, N. Y.

Frank Buckle, who recently resigned as mine superintendent at the Copper Mountain property of Granby Consolidated Mining, Smelting & Power Co., has become associated in a similar capacity with new underground and development operations at the asbestos

WAS SOLOMON WISE ABOUT TIN?

In all his glory, the ascended son of David and Bathsheba lived reverently close to tin. For it was of this whitest of all metals combined with copper that the Temple's Altar of Burnt Offerings, its giant portal pillars, Jachin and Boaz, and numerous architectural adornments were enduringly fashioned. Whether Solomon's wisdom or that of his builder, Hiram of Tyre, saw the great value of tin as an alloy constituent and dictated its lavish use in the Temple, is not chronicled. Nor is it important.

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property of the Canadian Johns-Manville Co. at Asbestos, Quebec.

William C. Gussow is now at the Arvida works of the Aluminum Co. of Canada as a resident engineer.

Davis C. Sharpstone, mining engineer, has returned to private practice and has left New York for South Africa, where he may be addressed care of the American Consul, Johannesburg, the Transvaal, South Africa.

John B. Knaebel, who carried on the initial development operations for the U. S. Smelting & Mining Co. in Grant County, N. M., as superintendent, has been advanced by this corporation to its engineering staff with headquarters at Salt Lake City, Utah. He will be an assistant to the president.

Ray Stark, sinter plant foreman at Crosby, Minn., has been made general plant foreman on the Cuyuna iron range for Evergreen Mines Co., at Crosby.

A. A. Gustafson, mining engineer, has been transferred from the New Orleans offices of Freeport Sulphur Co. to the New York City offices of the company.

Forrest M. Gross, who recently resigned as explosives inspector for the U. S. Bureau of Mines, has been succeeded by **Frank A. Wyant,** of Mt. Hope, W. Va., who has been transferred to the Duluth offices of the Bureau to be explosives inspector in Wisconsin and Upper Michigan.

R. H. Zeglin, a mining engineer with Bauxite Mining Corp., is in Jamaica, West Indies, on a professional assignment.

Palmer S. Gray, of Crosby, Minn., superintendent of mines of Cuyuna Range for Pickands, Mather & Co., has been appointed a member of the War Manpower Commission in Crow Wing County, Minn. He succeeds **C. E. McManus,** mine superintendent for Butler Bros. on the Cuyuna. Mr. McManus has been transferred to Cooley, Minn., on the Mesabi, as chief engineer for Butler Bros.

G. T. H. McMahon is now works manager of Sulphates Pty, Ltd., Yarroville, Victoria, Australia.

George A. More has become manager of Eldorado Tennant Creek, Ltd., Tennant Creek, Northern Territory, Australia. **G. W. Ciracovitch** recently resigned as metallurgist with New Occidental Gold Mines, N. L., Cobar, New South Wales, to accept similar professional work with Eldorado Tennant Creek, Ltd.

J. S. Macgregor has succeeded **Richard J. Lund** as director of the Miscellaneous Minerals Division of WPB.

Waldemar F. Dietrich, consulting mining and metallurgical engineer, and **G. H. Morse,** research and analytical chemist and owner of Morse Laboratories, announce the organization of the firm of Dietrich, Morse & Associates, to conduct investigative and research projects in the mineral and chemical industries, with special emphasis on the development of Western enterprises. Main office and laboratories have been established at 316 Sixteenth St., Sacramento 14, Calif.

Ernest R. Dickie, of Wickenburg, Ariz., effective Sept. 1 became general manager of Bagdad Copper Co., operating near Hillside, Ariz.

L. Grant, general manager of the Broken Hill Proprietary Co., Ltd., has retired after 32 years' service with the company.

John A. Foy, mining engineer, has been named superintendent of the Bear Creek Copper Mine near Siler City, N. C.

Arnold H. Miller, consulting engineer of New York, is in Mexico on an inspection trip and expects to return by the way of the Death Valley district of the West.

Dr. Edwin Sherbon Hills has been appointed to the chair of geology at the University of Melbourne. He is a graduate of that university and was later engaged in research work at the Imperial College of Science and Technology, London, until his appointment as lecturer at the University of Melbourne in 1932.

G. Lindesay Clark, deputy controller of minerals production and a director of Western Mining Corporation, Ltd., has been appointed a director of Broken Hill South Ltd.

J. D. Harlan, mining engineer, 1283 East South Temple St., Salt Lake City 2, Utah, has resigned as vice president and consulting mining engineer of United States Smelting, Refining & Mining Co., and expects to resume work at his profession.

W. I. Nelson, general superintendent of Granby Consolidated M., S. & P. Co., has been conducting an examination of the Blue Ledge mine, in Siskyou County, Calif., for his company.

H. W. Harrison has been appointed to supervise Tri-State mining operations of Eagle-Picher Mining & Smelting Co. **Harold Blackwood** will be in charge of mining and milling at Taxco, Mexico; and **Erle D. Morton** will act in a similar capacity at Tucson, Ariz. **Ray L. Hallows** has been made technical assistant to **J. M. Bowlby,** president and general manager of the company.

S. R. Zimmerly, regional engineer for the U. S. Bureau of Mines at Salt Lake City, has been inspecting mining properties in the Ely and Eureka districts of Nevada.

Samuel G. Laskey, district geologist for the Utah division of the U. S. Geological Survey, lately examined the Mount Hope lead-zinc-cadmium mine in Eureka County, Nev., operated by the Callahan Zinc-Lead Co.

Jonathan Robinson, Montreal attorney, was sworn in Aug. 30 as Minister of Mines for the Province of Quebec in the cabinet of the newly elected Union Nationale government, headed by **Maurice Duplessis.** The first to hold this title as a full-time responsibility, Mr. Robinson has long been known in Quebec as an aggressive worker. There is a prospect of his energies bringing important benefits to the expanding mining industry, which now ranks third among Quebec enterprises.

A. Ben Shallit, supervising engineer of the Joplin office of the Reconstruction Finance Corp., left Aug. 26 for Hollywood Beach, near Miami, Fla., where he reported as a lieutenant (j. g.) in the United States Navy. He is on military leave of absence from the local RFC office for the duration of the war, having previously enlisted in the Navy and received his commission. **W. L. Kepner** and **E. Y. Ellis,** both of Joplin, who worked under Shallit in the local office, will continue their work in his absence.

Dr. V. E. Monnett, director of the schools of geology and geological engineering at the University of Oklahoma, has been named dean of the graduate college for a period of two years by the university board of regents.

Frank F. Russell on Sept. 1 became president of Cerro de Pasco Copper Corp., following the recent resignation from that post of **Harold Kingsmill. Donald H. McLaughlin** on the same date succeeded **Raymond Spilsbury** as general manager of the company in Lima, Peru. Mr. McLaughlin has had a distinguished professional career, having been chief geologist for Cerro de Pasco (1919–1925) and consulting geologist for Homestake Mining Co. and other mining companies since 1926. He was for many years professor of mining engineering and geology at Harvard, from which university he received his A.M. degree in 1915 and his Ph.D. in 1919. For the past two years Dr. McLaughlin was dean of the engineering school at the University of California, Berkeley, Calif. He is held in high regard in mining circles in Peru.

OBITUARIES

Abraham Vermaire, vice president and general manager of Bethlehem Chile Iron Mines Co., at Minas Tofo, Chile, died Dec. 15, 1943, in Santiago, Chile.

William H. Schacht, president and general manager of Copper Range Co., died on Sept. 29 at Painesdale, Mich., at the age of 66.

Peter Thompson Graham, former prospector and promoter of numerous Canadian mining properties, died at New Liskeard, Ontario, on Aug. 22 at the age of 59.

William F. Green, mining engineer and since 1938 Provincial assayer of

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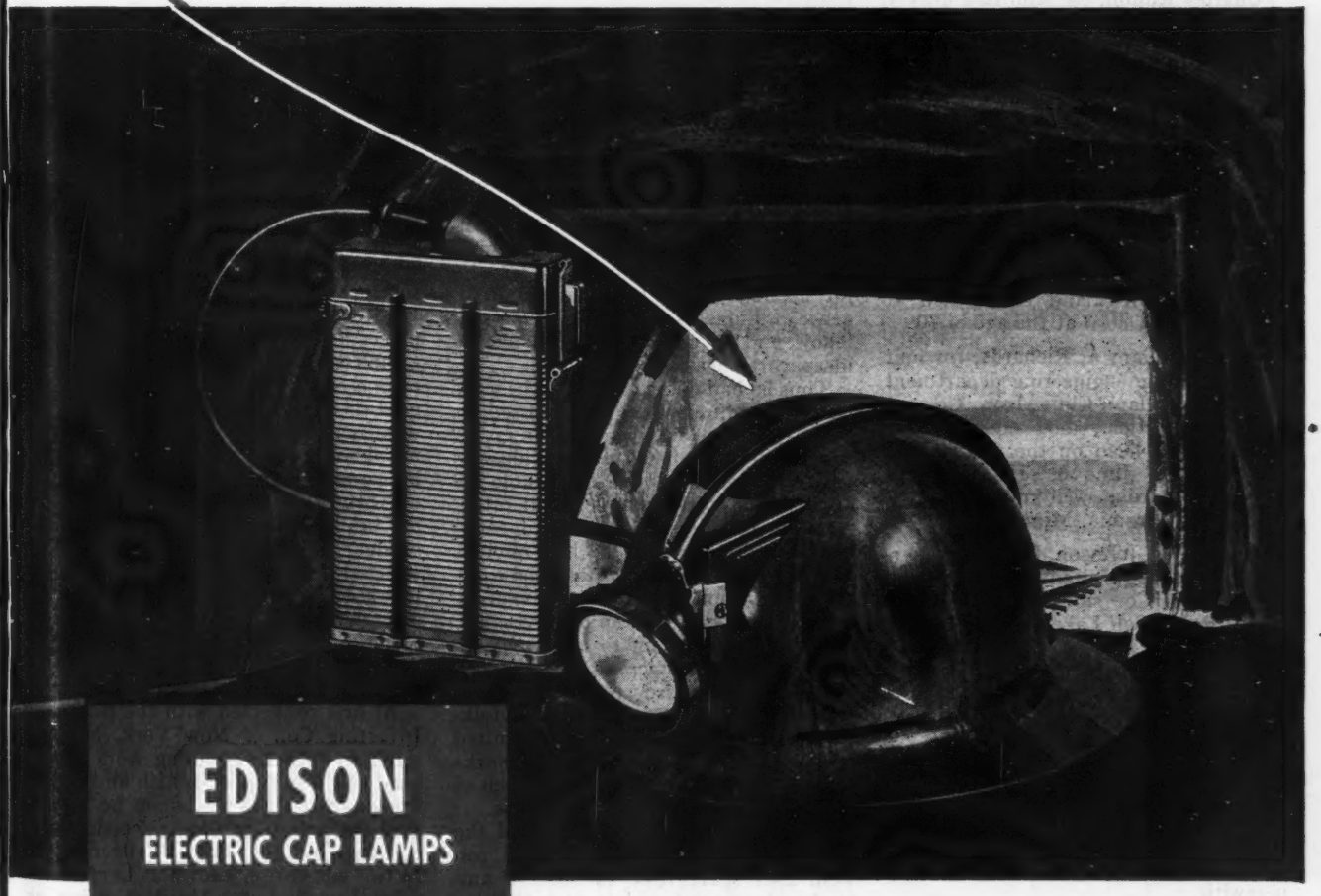

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Ontario, died in August last at his home in Ontario at the age of 66.

V. A. James, manager of Preston East Dome Mines, Ltd., died recently at the age of 52.

Robert MacDonald, 83, active in Canadian mining for more than half a century, died recently at Invermere, B. C.

Frank E. Hulett, inventor of a mechanical device which revolutionized dock-loading methods, died on Aug. 27 in Cleveland, Ohio, at the age of 68.

John ("Jack") Lorne Campbell, of Massey, Ontario, prospector identified with the Porcupine area and with many Canadian mining ventures, and a prominent member of the Conservative Party, died recently at the age of 63.

Henry C. Carlisle, consulting mining engineer, who left the Metals Reserve Co. recently after two years of service, has returned to his office at 315 Montgomery St., San Francisco, Calif.

Charles Ruffini, 58, who had worked in mining, mostly in El Oro district, State of Mexico, during his 38-year residence in Mexico, died on Aug. 27 at his home in Mexico City.

Arthur Alan Coaton, mining and consulting engineer prominently identified with Rand and South African mining development and operations, died recently at the age of 59.

Maj. James Goldie MacMillan, general superintendent of Teck-Hughes Gold Mines, Kirkland Lake, died at that place on Oct. 3 at the age of 70.

Major William A. Richards, for four years with the engineering department of the Cleveland-Cliffs Iron Co., at Ishpeming, Mich., died on the Normandy beach-head on the first day of the invasion, June 6. His father is **J. C. Richards,** well-known mining engineer of Virginia, Minn.

Edward W. Johnson, formerly superintendent of the United States Smelting & Refining Co. smelter at Midvale, Utah, died at Salt Lake City on Aug. 21 at the age of 77.

Alex. Fasken, K. C., long prominent in Canadian mining affairs, was killed in a motor accident on Sept. 19. He was 74.

Robert Kennedy Stockwell, a mining engineer of San Francisco, died in Oakland, Calif., on Aug. 24, at the age of 62. An appreciation of his life and work, by J. P. Hutchins, is presented herewith.

Prof. Joseph Ellis Thomson, head of the department of mineralogy, University of Toronto, died on Sept. 30. He was known widely as a specialist in microscopic examinations and identification of rock sections.

Dr. Gostä Phragmén, assistant professor of metallurgy at the University of Technology in Stockholm, died there of Aug. 31 at the age of 46. Dr. Phragmén received the Robert Woolston Hunt Award of the A.I.M.E. in 1940. He was a member of the Swedish Royal Academy of Engineering.

Dr. Walter Harvey Weed, geologist and an authority on copper mining, died in Altadena, Calif., on Sept. 6, at the age of 82. Dr. Weed served with the U. S. Geological Survey from 1883 to 1906, and edited the Mines Handbook from 1914 to 1925. His professional career included work in Canada and Mexico. At one time he was associated with General Development Company and Miami Copper Company.

Dr. Walter S. Landis, vice president of the American Cyanamid Co., died at Greenwich, Conn., on Sept 15, from a heart attack following his efforts in clearing the grounds of his home of wreckage left by the hurricane of Sept. 14. In addition to Dr. Landis' principal contribution to industry in developing a process for the production of cyanamid, he invented a method for the manufacture of nitrogen during the first World War and held more than fifty patents in the metallurgical and chemical fields.

Rupert Kennedy Stockwell —An Appreciation

By J. P. Hutchins

Rupert Kennedy Stockwell, who died in Oakland, Calif., was born in Birdsall, N. Y., in 1882, of English stock. He was a good engineer and a good companion. All who met him were impressed by his affection and sympathy for his fellowmen, by his fine intelligence, willingness to listen to the other fellow and to credit him with having ideas worth hearing.

Thus he had many friends in the more than 20 counties where he practised his profession. He was generous in giving to others the benefit of his wide and varied experience. He was able to advise as to costly, complex, and, often, novel installations in backward countries; and, because of his obvious sincerity, his counsel was followed without reservation and to the advantage and profit of those whom he advised.

His work took him to the U.S.S.R., Spain, North Africa, China, South America. He was deeply interested in foreign manners, customs, mores, folkways, social conditions. He acquired a splendid collection of Chinese works of art, and thus came to know much of the accomplishments of the Chinese.

He was an excellent example of the American, who, while doing his job well, uses spare time to observe and study places and people and thus to derive a helpful and intelligent understanding that redound in doing the job better.

Here is an interesting incident of one of his procedures. He examined a mine to learn if labor-saving machinery could be profitably installed. He formed a good opinion of the possibilities and bought shares in the company that owned the mine. An expensive plant was installed according to his advice. Profits were greatly increased. Subsequently he sold his shares advantageously and with the proceeds endowed beds in a hospital, situated in the city where was the home office of the company.

He was employed by Westinghouse Electric & Manufacturing Co.; United States Steel Corp.; United States Smelting, Refining & Mining Co.; Nevada Consolidated Copper Co.; Tennessee Copper Co.; Robins Conveying Belt Co.; Braden Copper Co., and by other companies here and abroad.

He was a member of the American Institute of Mining & Metallurgical Engineers, American Society of Civil Engineers, Engineers' Club of San Francisco, Engineers' Club of New York, Royal Automobile Club of London, American Club of London, and Shanghai Club of Shanghai.

Alexander Malozemoff —An Appreciation

By R. H. Ramsey

In Alexander Malozemoff, who died in New York on July 13, 1944, the mining industry lost a colorful personality and an outstanding engineer.

Born at Radzivil, Russia, in 1879, and educated at the university of St. Petersburg and at Freiburg, Mr. Malozemoff began his career at the Simsky district Iron and Steel Works in the Ural mountains, but in 1908 his forthright advocacy of democratic reforms resulted in his being exiled to Siberia by the Czarist government.

After helping develop a group of placer and lode gold mines, Mr. Malozemoff became in 1913 superintendent of one of the placer mines in the Lena gold fields district, and by 1917 he was manager of Lenskoe Zolotopromishlenmoe Tovaristchestvo. In 1918 he came to the United States to draw up with the Bucyrus Erie Co. the plans for what was then the largest gold dredge in the world. The fall of Kolchak, in Eastern Siberia, prevented his return to Russia, and after a survey of mineral possibilities in China for the Chinese government, he returned to the United States and became an American citizen in 1926.

At first connected with the Benenson Investing Co., of New York, he later returned to active mining work at the head of the group of British and American industrialists for whom he negotiated the largest mining concession ever granted by the Soviet government. In this enterprise, known as Lena Goldfields, Inc., and with Mr. Malozemoff as managing director, over $20,000,000 was invested in developing mines and building mills, smelters, and dredges. In 1929 the entire enterprise was confiscated by the Soviet government.

In 1936 Mr. Malozemoff returned to New York, and for the rest of his life he was active in developing various mining operations in Central and South America; notably, the Itabira iron mines and the Goiaz nickel deposits in Brazil,

(*Continued on page* 165)

REGIONAL NEWS

NEVADA

Metals Reserve to close last ore-buying depots—Bureau of Mines expands drilling program

★The last of Metals Reserve ore-buying depots and ore stockpiles in Nevada will be closed Dec. 31, Jay A. Carpenter, Metals Reserve advisory engineer in this State and Director of the State Bureau of Mines, has been notified by the agency. Two depots at Battle Mountain and Winnemucca that have received some manganese ore and mercury will be closed on that date. A scheelite stockpile near the Getchell mine, containing some 80,000 tons and said to be the largest in the country, was closed in July and a stockpile of oxidized lead-zinc ore at Jean, Clark County, was closed earlier, although drilling has continued by the Bureau of Mines on nearby Goodsprings mines that supplied this ore. At the Three Kids mine, near Las Vegas, a stockpile of around 300,000 tons of low-grade manganese ore remains a problem for future disposal. It appears that no manganese mines in Nevada can be expected to meet new Metals Reserve specifications for a 48 percent product.

★Cons. Coppermines Corporation, operating underground and open-cut mines at Kimberly, White Pine County, reports net income before depletion $127,694 for the second quarter of 1944, compared with $150,309 for the second quarter of last year. John A. Payne, president, 120 Broadway, New York, said net income for the first six months of the current year was $145,383 against $119,308 for the 1943 half year.

★Exploration drilling projects in Nevada of the U. S. Bureau of Mines, scheduled for the new fiscal year beginning July 1 and now well under way, are of wider scope, on greater variety of minerals, and employing more technical personnel than ever before, in many instances following preliminary work of the Geological Survey or of the Bureau's geophysical survey branch. Glenn L. Allen, district engineer in Nevada for the Bureau, has reported on progress at several iron ore deposits, one owned by J. Phelps Stokes, of New York, and another, the Segerstrom-Heizer property, in Pershing County, shipping some 200 tons per day of crushed and graded hematite to Pacific Coast shipyards for ballast. Two fluorspar deposits of major volume, one indicating an acid-grade product, are being drilled, as are two tungsten properties, including the Riley mine, in the Potosi district of Humboldt County, which has supplied some 80,000 tons for the scheelite stockpile near the Getchell mine, where the 400-ton tungsten concentrator closed down with termination of MR contracts.

Locomotive of Bingham and Garfield railroad, subsidiary of Utah Copper Co., uncovered after being buried for a month in mud and débris of a slide above tailings pond near Magna. Slide occurred Aug. 4, and locomotive was towed to company shops for major overhaul Sept. 10. The crew of seven escaped injury.

★Lead-zinc claims that produced high-grade ore in the seventies, situated in Mill Canyon, north of Cortez, in Eureka County, are being reopened by Joseph McCarthy, Colorado mining engineer, in association with Harmon Walker and Don Burgner, of Reno, who secured the claims under lease, by court order, from the long bankrupt Majestic Mines Co. The lessees are said to have shipped nine carloads of ore to Utah smelters and have moved part of a flotation mill to the property.

Diamond drilling is said to have been resumed with more efficient equipment on the old Groom lead-silver mine, in western Lincoln County, by the International Mining Corp. of New York. The concentrator was closed down several months ago for lack of labor, but stopes are being prepared for resumption of mining, and some shipments of direct-smelting ore are said to have made satisfactory returns.

ARIZONA

Custom mill for Chloride area—Fire damages Mohawk shaft of Mammoth-St. Anthony, at Tiger

★Callahan Zinc-Lead Mining Co., originally operating in the Coeur d'Alene district, Idaho, reports closing its mining and milling operations near Patagonia and Nogales, Ariz., and transferring its mining and milling equipment to the Mount Hope mine, near Eureka, Nev., in which property Callahan is said to have purchased a 51 percent interest in a lease. Mining operations at the property are reported to be opening a body of zinc-lead ore.

★Fire at the Mammoth-St. Anthony mine, at Tiger, Ariz., destroyed the Mohawk shaft and surrounding buildings on Sept. 4. The mill, the main Mammoth shaft, and the pumps were not damaged. Construction has already been started to replace the hoist house, headframe, and coarse-ore bins, and to repair the damage to the crushing plant. This mine has for many years been an important producer of molybdenum, together with gold, lead, and some vanadium. It was formerly an oxide-ore operation through the Mammoth shaft. On Aug. 1 the smelter, molybdenum-vanadium salt plant, and oxide plant were closed, and mining operations were directed wholly to the production of lead-zinc sulphide ore. Because this sulphide production requires rehabilitation of the Mohawk shaft, operations will have to await new equipment. After some repair work has been completed in the Mammoth shaft, and a compressor has been installed, development work will be continued through this shaft.

★Tennessee Schuylkill Corp. has adopted a six-day week at the Tennessee mine and mill on account of the high rate of absenteeism on the seven-day schedule

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EVERYTHING BULLARD IN SAFETY

Arizona (*continued*)

and the lack of ore during the development program. The mill has been put on a two-shift basis while development is progressing, and will treat about 100 tons daily, or two-thirds of its capacity.

★W. L. Witt and associates of Henderson, Nev., have purchased the Keystone mill, in Mineral Park, from L. L. Robinson, of Los Angeles, and will recondition it for use as a custom mill for mines at Cerbat, Mineral Park, and Chloride. The establishment of a custom mill for the Chloride area is expected to revive operations at a number of properties that will welcome an outlet for their ores. Associated with Mr. Witt in the project are Frank J. McEntee and O. H. Sherrill, metallurgists, and M. J. Croell, mining engineer.

UTAH

CIO political action pot still boils—Suit filed to exempt premiums from federal taxation

★Late in August additional heat was injected into the controversy over efforts of the CIO political action committee to influence members' votes, when Harry G. Grigsby, representative of a fraternal order and not a union member, declared in an affidavit that members were told to "Vote straight Democratic from President down through Governor" at a meeting July 25 in Tooele city hall.

Mr. Grigsby's affidavit was accompanied by a carbon copy of minutes which he declared were a true and correct record of proceedings of the meeting. These minutes contain a paragraph as follows:

"Joe Beck asked: 'If a man represents labor, regardless of other good or bad qualities, financially, morally or otherwise, are we to understand if the State CIO-PAC indorse him we are to support him? The answer was 'Yes' if we indorse him the members are to vote for him. We are interested in labor. This statement was made by Mr. Marble (J. Frank Marble, president-secretary of district Union 2, International Union of Mine, Mill & Smelter Workers)."

The minutes also state that all Tooele local unions were represented at the July 25 meeting; also the Eagles. "Letters had been sent to the Fraternal Order of Eagles, Wild Life Assn., Masons, Junior Chamber of Commerce, Lions, railroad, farm bureau, and the L D S church, inviting them to join the meeting. Rev. Evans was contacted by telephone," they state.

Clarence L. Palmer, president, and Mr. Marble, secretary, Utah political action committee, in reply, said the charge "is absurd on its face!" They said the question had been raised at the meeting whether members were bound to support candidates recommended by the state and national PAC committees. "The answer was given that if any member of the committee could not conscientiously support the candidates indorsed, they should resign from the county PAC. As members of the union they would then be free to support and vote for any candidate they chose."

★Virtual extinction of silicosis lies ahead if management and labor cooperate on reasonable preventive measures, Dr. L. U. Gardner, Saranac Lake, N.Y., director of the Trudeau Foundation and a nationally recognized research specialist on silicosis and tuberculosis, asserted at the 50th annual convention of the Utah Medical Association, on Sept. 25, in Salt Lake City.

Steps required to wipe out the disease, he said, are: (1) positive measures to control silica dust, including full cooperation by workers, even if this may require extra effort; (2) employing only persons not predisposed to tuberculosis as determined by X-ray for work where exposed to silica dust.

Steps were taken towards organizing an educational program for Utah physicians on silicosis and other occupational diseases. O. A. Wiesley, State industrial commission member, said the commission favored such a plan.

Positive suggestions given to physicians by Dr. Gardner were: (1) Don't diagnose silicosis merely on the basis of employment in an industry where silica dust is present; satisfy yourself that the patient has been exposed to enough dust to cause the condition. (2) Don't diagnose silicosis in men exposed to dust for only a few months. It takes 5, 10, or even 20 years' exposure to produce the disease, even where large amounts of dust are present. An exception might be where men are exposed to heavy sandblasting with siliceous material. (3) Don't diagnose silicosis unless the X-ray shows the characteristic nodulation uniformly distributed throughout the lung. Even though this pattern is present, silicosis should not be diagnosed unless the physician is satisfied the patient has been exposed to free silica dust. Other conditions may produce a nodular type of change which is benign and causes no impairment of function.

★Work at the roaster division of the International Smelting & Refining Co. smelter at Tooele was stopped Sept. 12 and 13when 17 employees of the division ceased work. This closed operations of the entire smelter, but workers were assigned to other tasks still undone because of man-power shortage.

Company officials said the "sit-down strike" occurred because Mrs. Mildred Ash, employed in the roaster division, had refused to join the local union, International Union of Mine, Mill & Smelter Workers (C I O). Union officials claimed it was because the foreman, Eldon Galleher, had threatened to discharge other women employees if they persisted in efforts to induce Mrs. Ash to join the union. Mrs. Ash remained away from work one day, declaring "It's pretty terrible if a patriotic citizen can't work in a war industry and do her part to win the war

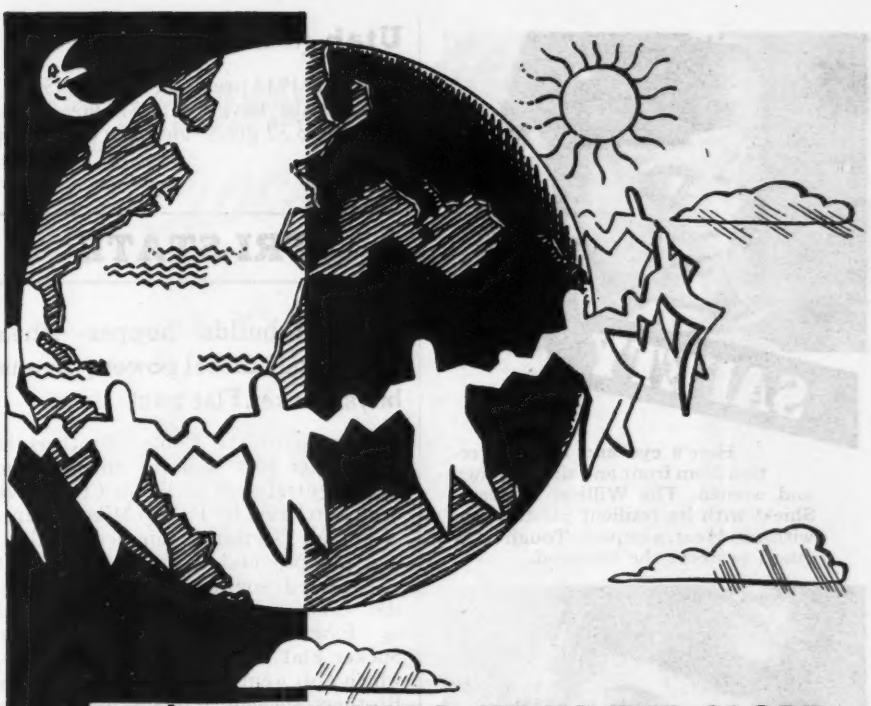
without belonging to an organized group to pay the high salaries of its leaders." She said she did not intend to join the union and did not believe in paying an organized group to keep her job. "I've got a brother in France and he doesn't need a union card to do his bit overseas!" she asserted.

Mrs. Ash was transferred to another department and at last accounts is working there daily. Company and union officials issued a joint statement Sept. 14 saying the dispute had been "satisfactorily settled on a temporary basis" and both sides "have expressed their appreciation of the efforts of the other party in controlling this dispute without a serious or material interruption to production." "It is understood, however," the statement continues, "that the union will file a complaint against the company based on the alleged anti-union activity of the foreman."

★H. Y. Walker, New York City, vice president in charge of smelting operations, American Smelting & Refining Co., praised the work of women who have donned overalls and are helping smelt metals vital to the war effort, Sept. 7, while on a routine inspection trip in Salt Lake City. Mr. Walker conferred with William J. O'Connor, Utah manager, and visited company smelters at Murray and Garfield. He was accompanied by R. C. Reese, his assistant, and J. C. Emmison, comptroller, both of New York City.

★Fallacy of certain economists advocating that this country conserve mineral resources and supply metallic needs from foreign purchases was pointed out by Paul H. Hunt, Keetley, mine manager, Park Utah Consolidated Mines Co., addressing the Salt Lake City Kiwanis club Sept. 14. He pointed out the United States has been producing virtually all her own metallic needs for 75 years and this production amounts to about one-half the world production of such metals. To shut down domestic mines, even gradually, would mean that prices for foreign metals would soar to record heights, while ability to discover and recover mineral wealth would fall into decay at home, he asserted. He said mineral wealth will be wrested from the earth in this country only to the extent to which men are permitted to exercise their ingenuity and for which they are rewarded.

★Silver King Coalition Mines Co. filed suit in the federal district court against the State Tax Commission Sept. 14 to prevent collection of taxes on federal metal premiums. As in a recent suit filed by Kennecott Copper Corp., Silver King contends premiums paid mines to increase war production are special allowances not subject to excess profits tax. Purpose of the premiums, the firm maintains, is to compensate mines for losses incurred by forced or excess war mining production. The company, a Nevada corporation operating properties in Summit County, says it was taxed $18,503.37, or a total compounded of 1 percent gross sales plus



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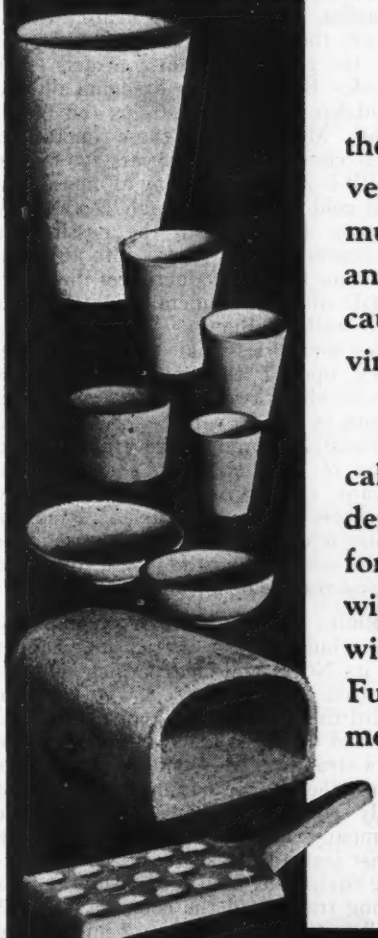

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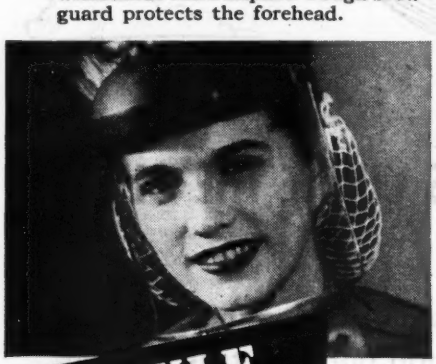

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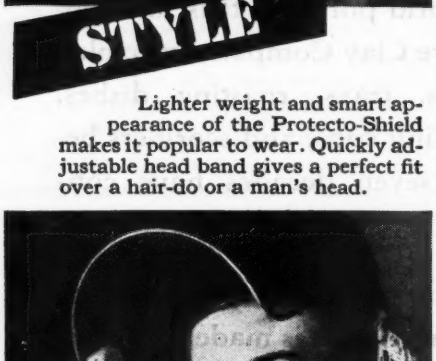

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Utah (*continued*)

1 percent 1943 premium of $453,353.54. Tax should have been $13,969.83 on $1,396,983.32 gross sales, the complaint alleges.

TRI-STATE

Rialto rebuilds hopper—Rhea mill instals diesel power—Evans buys Sucker Flat tract

★Interests of the Cooley Brothers in the Sucker Flat open-pit mine, in the south-central part of Webb City, have been purchased by F. W. (Mike) Evans, of Joplin. Certain equipment, including pumps, and the washing plant constructed southwest of the pit by the Cooley Brothers, were acquired by Evans in the transaction. The Sucker Flat tract comprises 76.5 acres, which also went with the deal. Cooley Brothers suspended operations at the open-pit mine during August, and since have moved their large electric-powered dragline shovels to Colgate, Okla., where they are working a coal deposit for the government on contract. The Cooley Brothers were dredging alluvial gold deposits at Como, Colo., and Townsend, Mont., when those operations were closed about two years ago by the WPB L-208 order closing all non-essential gold mines. Through Evans they became interested in the possibilities of converting the "flats" into an open-pit mine for the production of then war-vital zinc-lead minerals. With their two walking Bucyrus-Monighan draglines, and in less than two years' time, they opened the mine, which now covers about two acres, to a maximum depth of 174 ft, with benches rising to the east, and produced several thousand tons of zinc and lead concentrates. Evans emphasized that the Cooley Brothers had by no means depleted the mine, and that arrangements would be made sometime in the future to reopen it and resume operations.

★Rialto Mining Corp. has completed the rebuilding of a derrick and hopper at its No. 2 mill shaft, which was destroyed by fire Aug. 3. It was the third time the derrick-hopper unit had burned during a five-year period. The new structures are smaller than previous ones, the hopper having a capacity of only approximately 350 tons. The company has installed a first-motion hoist instead of electric-powered hoisting equipment used previously. Ore is being trucked to the company's No. 3 mill to the west, the No. 2 mill having been destroyed by fire Feb. 12, 1942.

★The Rhea Milling Co. has reconditioned and placed in operation the Rhea mill, near Neck City, for the retreatment of tailings from the Little Mary property, according to Howard Saunders, of Baxter Springs, one of those interested in the operating company. The mill, which is powered by a newly installed 150-hp. Cummi diesel power unit, has been overhaule to handle 40 tons of tailings an hou and is being operated two-shifts. Th company has about a year's run fro tailings on the Little Mary property Saunders pointed out that the mill wa acquired from the W. A. Rhea Minin Co. by lease, and that the only chang was the installation of the new powe unit and general overhauling of the mil by the operating company.

★Cox Mining Co. has entered into a operating contract with the Southsid Mining Co. for the operation of th latter firm's milling plant near Chit wood, according to George W. Moore of Joplin. The Cox company wil treat ore from the O'Jack Mining Co properties on West Seventh St., nea Hero's Crossing, in which Arthur Co also is interested. A new shaft ha been completed by the O'Jack com pany to a depth of 135 ft., which i 46 ft. below the former workings of th company from another shaft. A ne derrick and 300-ton hopper has bee built over the shaft. The compan plans to install a large compressor t replace a 350-cu. ft. steam outfit no in use. Luther Owens is ground fore man at the O'Jack mines and C. W (Tuck) Ritter will be in charge o milling operations at the Southside mil

★Messcave Mining Co. has stripped the overburden from a half-acre of th Windsor tract on the Robeson land north of Galena, in the Short Cree bottoms, preparatory to expansion o mine operations in the area, accordin to Marvin Robinson, of Galena, on of the partners in the company. Eigh feet of overburden has been removed and a 4-ft. stope in ore will be carrie in the mining operations. Air fo drilling is furnished by a Schram port able compressor. The company i operating a 1½ yard dragline powe shovel with 50-ft. boom for strippin the overburden and loading the ore The latter will run between 8 and percent in recovery values of zinc an lead, and is being trucked to the Lucky Jack mill, between Carl Junction an Smithfield, for treatment. Associate with Robinson in the enterprise ar H. W. Williams, E. A. Gaede, an Don Gaede, all of Galena; Cecil Largen of Picher, and Glenn Richey, of Car Junction.

★That the famous zinc-lead minin field of the Tri-State district of Okla homa, Kansas, and Missouri alread has produced concentrates to exceed billion dollars in value, and in term of metal more than a billion and a ha in value, is shown in a compilation b Victor Rakowsky, consulting minin engineer in the Joplin district. I summarizing his compilation, Rakowsk said: "This is a great contribution to th national income of our country durin the past century, and the remainin lower grades of zinc and lead ores mus be extracted and consumed in th interest of national minerals conserva tion. Our objective now must be t fight hard to maintain our contributio to the national wealth and not permi

any factors, political or economic, to break down our position. This means high technology—based on common sense—applied to the problems of continued production, with willing manpower and personal pride on the part of the citizenship of this region."

COLORADO

Strategic mica shipped from Clear Creek County—Ajax mine produces high-grade gold ore

★Western States Mining Co., a California organization, has shipped five tons of strategic mica from a deposit at Floyd Hill, near Idaho Springs, to the Colonial Mica Corp., Asheville, N. C. The Floyd Hill deposit is reported to be unusual in both size and quality. The uncovered area is 40x600 ft. and yields books of mica several inches thick and up to 10 in. square. The current shipment is the second to be made from Idaho Springs. Valued at $1,500 per ton, the raw material could have been greatly enhanced in value if it had been trimmed for market. Consequently a trimming plant will probably be installed. Equipment at the mine will also be improved so that larger operations can be undertaken.

★The six-months' report of the Midnight Mining Co., at Aspen, shows a change in the ore below the 15th level, with little high-grade showing on the 16th. Lead shipments for the first half of 1944 showed an 18 percent decline compared with 1943, but zinc shipments increased 14 percent. Silver declined 49.5 percent because the silver content of the ore was less than half what it was in the same period of 1943. Newly elected officers and directors are: L. E. Russell, president; Fred T. Willoughby, vice president; Francis Willoughby, secretary-treasurer; T. W. Bowman, E. P. Bach, H. P. Curtis, L. P. Tease, and C. A. Beck, directors.

★The Mystery gold mine, south of Silverton, is being opened by Superintendent C. K. Woods. President Warren Prosser states that the company plans to make ready two tunnels from which orebodies can be worked. Parts of the Empire and the Jennie Parker tunnels are being cleaned out and retimbered, and the orebodies will be worked from both tunnels. They have as a part of the program the building of a 25-ton mill, with provisions for enlargement, as milling grade ore can be broken immediately.

★E. P. Moe, developing the Boston mine, between Republican and Democrat mountains at Georgetown, is stepping up operations at the mine; and in recent months has made three shipments. He is now busy cleaning out the workings and retimbering drifts and stopes. The zinc-lead ore averages about two feet in width.

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Colorado (*continued*)

at Salida, was closed the first of September because of insufficient ore. H. A. Grine, who has been in charge of the office, states that 3,000 tons of ore was shipped through the station, consisting mostly of small lots.

★B. I. and O. E. Pickett, of Gateway, have shipped several truckloads of manganese ore from the Warden Mining Co.'s property on the Powderhorn. They have opened a vein four feet high and a foot wide, along with other deposits. This property shipped manganese ore during the first World War.

★The Ajax mine, in the Cripple Creek district, recently shipped a car of gold ore to the Golden Cycle mill, at Colorado Springs, that assayed 7.7 oz. of gold to the ton, which is the best ore shipped from this district in several years. This ore came from an extension of the discovery made two years ago, when the Bobtail vein was cut in the Ajax property, and was made in a section where no ore was expected. The vein has been productive in the Portland mine, and was struck at depth in the Ajax in ground recently drained by the Carlton tunnel.

★Three claims of the Weber group, on Mt. Bross, at Alma, belonging to N. P. Otis, have been leased by R. H. Luckenbach. These claims have several outcrops of a flat bed of zinc-lead ore, and it is planned to strip the overburden and develop an open-cut operation. Production will be shipped to the reconditioned Record mill, formerly operated by James N. Redman in connection with the American mine. Mr. Luckenbach has been in charge of operations at the Orphan Boy mine, which produced a considerable amount of zinc during the past two years.

★Charles N. Bell, representing the King Lease at Ouray; C. W. Plumb, of the Idarado Mining Co.; William Cutler and Al. Fredericks, the Revenue; E. W. Creel, the Mickey Breen; Ralph Wright, the Colorado Sunrise; and Oliver Fellin, of the trucking interests, appeared recently before the board of county commissioners to ask that the roads serving the mines in the San Juan section be kept open during the winter months to assure continued production from the mines. They were promised help and told that an order had been on file with the WPB for months for a four-wheel drive truck which could be used in this end of the county. The new piece of equipment could handle snow and keep the mine roads in operating condition.

IDAHO

Lincoln company finally gets patent papers to six claims in the Evolution district

★The Highland-Surprise Mining Co. is the first in the Pine creek section of the Coeur d'Alene district to declare a dividend from mining operations. On Oct. 15 this company will pay its stockholders 12½c. a share on stock of record Sept. 15. The total dividend payment amounts to $123,704. The company is producing zinc-lead ore from two different parallel veins, the Highland at a depth of 300 ft. and the Surprise at 500 ft. Operation is through two separate shaft openings, and the concentrate produced in the company's 300-ton flotation plant is a composite zinc-lead concentrate, which is shipped by truck to the Sullivan zinc plant, at Kellogg, where payment is made for both the zinc and lead content. Company officials attribute their present prosperity to the mine management of Mike Kinsella, who took charge of mining operations about a year ago. Prior to that time the mine had not been making expenses. Kinsella straightened and shortened the haulage tunnels, improved the hoisting and milling equipment, reorganized the mining crew, and, in addition, opened new orebodies by drifting beyond step faults where other operators had suspended work. The company is planning to go to deeper levels and further improve its mining and milling facilities for larger production to meet expected changes in metal market prices after the war. Dr. Charles R. Mowery, of Spokane, is president and H. M. Hueman, of Wallace, secretary. The company employs 50 men and produces about 115 tons daily, shipping approximately 600 tons of concentrates monthly.

★The Federal Mining & Smelting Co. has declared its third quarterly dividend of 50c. a share for the year 1944, amounting to $123,320 and payable Sept. 20 to stock of record Aug. 24. This brings Federal's dividend payments this year to $369,964 and the grand total to date to $29,747,604. The company's largest paying mine in the Coeur d'Alene district at present is the Page, at Kellogg. Its Morning mine, at Mullan, which was formerly the largest producer, is now producing only a small part of its rated capacity because of a shortage of labor. The company's big Morning milling plant, of 1,500 tons' capacity, is operating on dump material handy to the mill and on ore from the Frisco mine, in Canyon Creek, northeast of Wallace, which is producing about 100 tons a day of zinc-lead ore. This operation is also curtailed because of labor shortage.

★The Lincoln Mining Co. has obtained patent papers to the Rotbart, Schiller, Zweig, Hans, Plover, and Gretchen mining claims, in the Evolution mining district near Osborn, after eight years of negotiation with the government land office. The claims mentioned are under long-time lease to the Silver Dollar Mining Co. The Rotbart and Schiller claims are involved in the recent rich discoveries in the Chester vein system. At a depth of 3,100 ft. from the collar of the Sunshine shaft the Rotbart claim holds the richest and largest part of the Chester vein so far developed, production profits from which are divided on a three-way basis among Sunshine, Polaris

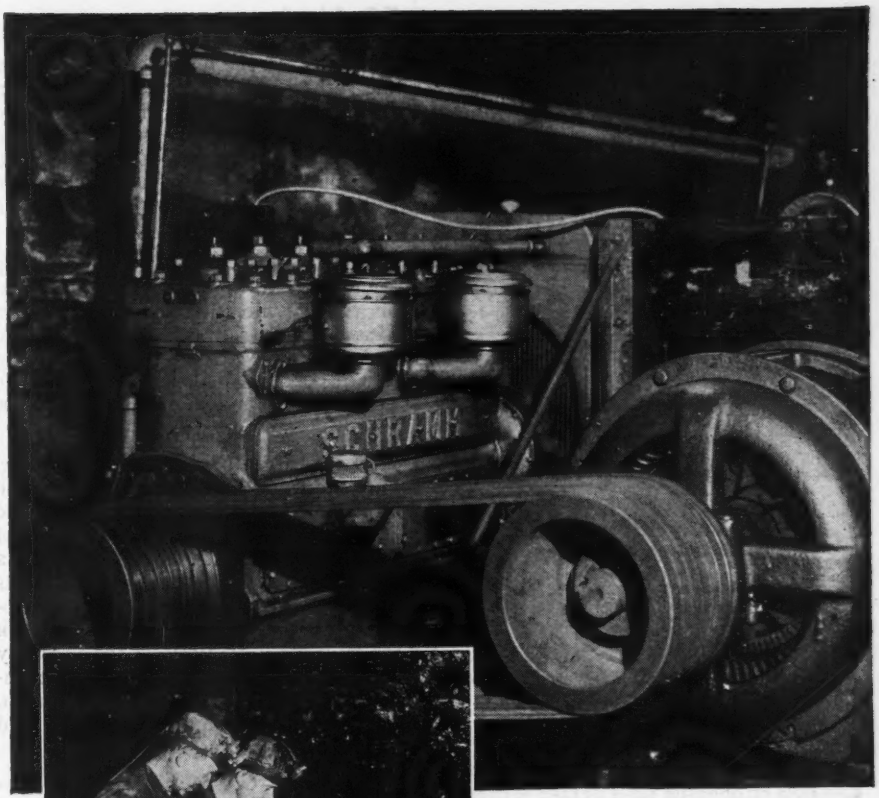
and Silver Dollar Mining companies, with the Lincoln company coming in for 12½ percent of the Silver Dollar interest. The settlement agreement of the three major companies provided for 400 ft. in length on the vein, but owing to a faulted cross-section of the orebody, the distance has been automatically lengthened to over 500 ft. Present developments indicate the entire distance will be in high-grade ore. All of it is exceptionally rich, compared with other orebodies of the district. Deeper opening on the same orebody will eventually extend into Lincoln's Schiller claim.

★Heads of departments of the Idaho Bureau of Mines and Geology are making a seasonal study of mineral districts throughout the State. Prof. W. W. Staley has been stationed at Challis as consulting mining engineer in that district. In the Whitebird area and west toward the Snake River, Warren Wagner and Carlton Spalding have been making a geological reconnaissance, and Dr. Alfred Anderson, professor of geology at Cornell, is continuing his geological studies in southeastern Idaho. Hydrogen reduction of iron ores existing in Washington and Clearwater counties, consisting of bodies of high-grade magnetite, is being studied by Prof. Joseph Newton, and the Bureau's metallurgist, Lewis Prather, has been working on the brine leaching of lead oxide ores in the Mackay district.

★Native mining engineers representing the Chinese government, Dr. Ching Y Li and Dr. Wei Tung Hu, have been in the Coeur d'Alene district the past few weeks studying the mining and milling methods of the big mines of the district, which they propose to apply to the future development of China's mineral resources. They were guests of the Northwest Mining Association, in Spokane, where they listened to a talk on the mining industry of this country by Paul W. Clymer, of the United States Bureau of Mines.

★The old Black Horse lead mine, in the Summit mining district about 15 miles southeast of Murray, has been purchased by a group of local men from Wallace and Mullan, who have formed a company to reopen the mine and do new prospect work. The old Black Horse Co. shipped considerable ore from near the surface, which is said to have averaged over 80 percent lead in carload lots. The property is developed by three tunnels, from which stoping operations were carried on in apparently limited shoots of ore. The lower tunnel shows four separate shoots of ore stoped out, one of which is quite extensive. On this last-named shoot the present owners are preparing to sink a prospect winze. The ore occurrence is in the Prichard slate.

★A fluorspar deposit reported to assay 98.4 percent CaF_2 has been discovered on Dry Creek near Superior, Mont., by Joe Brooks, a miner from the Sunshine mine. Brooks has sold the property for a stock consideration to the Coeur d'Alene Extension Mines Co., which has moved an air compressor and mining



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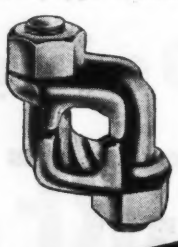

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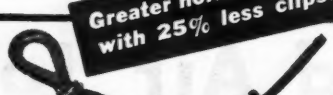

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Idaho (*continued*)

machinery to the fluorspar deposit from the Hansy copper prospect, near Adair, Idaho. The company has constructed a road to the Dry Creek property and expects to be sacking fluorspar mineral immediately. The deposit is reported to be 30 ft. wide and worth $42 per ton f.o.b. Superior.

★The U. S. Bureau of Mines is exploring a mica deposit about 35 miles northeast of Grangeville, Idaho, in the Mica Mountain district. This is the second season the Bureau has prospected in this area. Last year it completed 18,600 ft. of trenching, moving 24,000 cu. yd. of overburden.

★The old Continental lead-silver mine, in Boundary County, has been leased by Martha Clockman, the owner, to James E. Small and S. K. Garrett, of Wallace. The lease is said to be for a ten-year period. According to reports of the Idaho Inspector of Mines, production from the property dates back for 50 years. In 1921–22 the property was equipped with a 250-ton concentrating mill and employed 50 men. The new leasers have not announced any operating plans.

★The Silver Crescent Mining Co. reports it is breaking even in development operations of a gold property near Bonners Ferry, Idaho. The company also owns the old Cruse and Belmont gold mines, at Marysville, Mont., the Franklin mine, at Helena, and the Vosburg mine, at Winston, all of which were closed under WPB order L-208. In the Coeur d'Alene district the Silver Crescent Co. owns the old Charles Dickens lead-silver property and a 150-ton modern flotation mill on Moon Gulch between Wallace and Kellogg.

★A new pipe line and pumping station has been completed by the Denver Development Co. at the Little Pittsburg mine, on Pine Creek, for the purpose of furnishing wash water to the company's 150-ton milling plant. The new installation raises the water 900 ft. from Pine Creek and delivers it to the mill at the rate of 250 g.p.m. through 650 ft. of pipe line.

★The capacity of the Idaho Lakeview Mining Co.'s mill at the Hewer mine, at Lakeview, Idaho, is being increased from 100 to 200 tons daily by addition of a Hardinge mill and Simplex classifier. Under present labor conditions the mine is operating with only 15 men. Jerome L. Drumheller, of Spokane, is president of the company.

★Idaho representatives appointed by Governor C. A. Bottolfsen to attend the mining conference held in San Francisco in August by 12 western mining states were Donald A. Callahan, president of the Callahan Consolidated Mining Co., of Wallace; Arthur Campbell, State Mine Inspector; John D. Bradley, of the Bradley Mines Co., at Stibnite; Edward L. Lavine, Arco mining operator; and Harry W. Marsh, secretary of the Idaho Mining association. Acting on resolutions of the conference, the 12 Western governors will convene at Phoenix, Ariz., later this fall.

★The Spokane-Idaho Mining Co., Jay P. Graves, Spokane, president, has continued its main working shaft at the old Constitution mine, on Pine Creek, from the 800- to the 1,000-ft. level. The company is remodeling its milling plant by installing a regrinding circuit for more selective flotation of zinc-lead ores. The mine employs about 50 men and is producing approximately 100 tons per day.

★According to a report by Manager R. D. Leisk of the Sunshine mine, the recently discovered Chester orebody produced 56,454 tons of ore during the first six months of 1944. The mill feed during this period average 7.56 percent lead and 40.74 oz. silver per ton. Recoveries totaled 2,267,507 oz. silver, 8,408,077 lb. of lead and 487,748 lb. of copper. Net smelter returns were $2,082,255.32.

ARKANSAS

Labor shortage lowers output of manganese—Zinc production of area also remains low

★Lack of labor is gradually reducing the production of manganese in the Batesville-Cushman field. Some miners have gone to work in other sections, and others are now moving with their families into the bottoms to pick cotton. Total production for the field for August ran to 1,218 tons, of which 635 tons was high grade and 583 tons low grade. Except for lack of labor, mining conditions in the field were excellent from July up to early September.

Arkansas Manganese Co. was the largest producer in August, turning out about 510 tons, of which 250 tons was high grade and 260 tons low grade. The company operates the Aydelotte property, near Cushman.

★The Davis Mining Enterprises, a new company, has entered the field and started operations. Headed by J. A. Davis, of St. Louis, Mo., the company will operate the Southern Hill property, near Cushman, leased from the holding company, the Southern Hill Mining & Manganese Co. Operations are in charge of John L. Mothershead. An office has been opened in West Batesville, and construction of a washing and concentrating plant has been started on the Bayou about 6 miles from Cushman, which will give an adequate water supply. Crude ore will be trucked from the mines to the mill.

★A power shovel is now in operation on the Turner property, near Mt. Pleasant, Izard County. The property is operated by Stanley Bourne and Ernest Stroud, of Batesville. Open-pit operations will be adopted from now on, with the first pit expected to reach the ore level late in September.

★Standard Mining & Milling Co.,

Batesville, is not yet in production, and will have to make some alterations before getting started. The company operates the Blake property, near Batesville.

★Operations in the North Arkansas zinc and lead field made no gains during the last 30 days. Only one car of low-grade sulphide ore was shipped in August. No shipments were in sight for September, but October should show an increase.

★The Advance Mining & Engineering Corp., operating the North Star mine, on Crooked Creek near Harrison, shipped one car of low-grade sulphide ore in August. Its concentrator is an air-process plant, and during the past few weeks the company has been rebuilding it and making new installations. They have rebuilt the screens and have added a dryer to dry the ore thoroughly before concentration. They may install a wet concentrating table to take care of the fine ore.

★James Rogers, of Harrison, operating the Coon Hollow, in the zinc district, plans to start producing soon. He has proved a good reserve of ore, which he expects to treat at the Moark mill.

★Louis Frader, of Eureka Springs, and associates are now conducting operations on Section 16 near Buffalo, Marion County. They have opened a large deposit of high-grade zinc carbonate and expect to build a milling plant soon. They will also improve the road connecting their mine with the county road.

★S. & G. Inc., operating the Hurricane mine, near Pindal, Searcy County, has not yet put its big milling plant in full production. Test runs have shown that the plant will handle the ore successfully. Dry weather this summer reduced the water supply, but a well will be drilled near the mill to take care of the shortage.

★Moark Mining Co., operating the Almy, Red Mill, Jack Pot and other properties in the zinc district, is making alterations in the mill to increase capacity up to 50 tons of crude ore per day.

CALIFORNIA

Chrome producers still seeking concentrator—Grass Valley gold operators employ 500 men

★Production of hand-sorted chrome ore continues from the Rivers, Seiad Valley, and other properties in the Klamath River region of Siskiyou County, including the Hamburg and Orleans. Operators still are trying to obtain a concentrating plant, establishment of which would facilitate mining of substantial tonnages of ore too low grade for shipment, after WPB refused several weeks ago to authorize installation of such a unit in the Seiad Valley.

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CONCENTRATION PRODUCTS

★ *The ORIGINAL Deister Company • Inc. 1906*

MR. CLOG SCRAMS Everytime a DIXIE NON-CLOG HAMMERMILL IS INSTALLED

Mr. Clog, who is a KILLER of time and a trouble maker in general, need bother you no more.

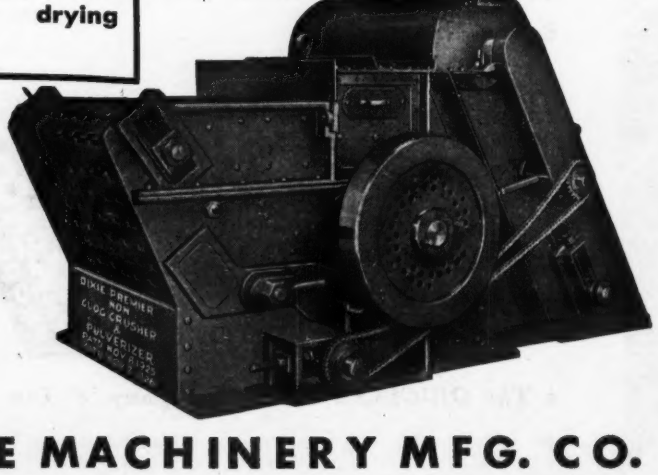
The answer is in the DIXIE Non-Clog Hammermill—the only crusher with a moving breaker plate. Provides positive mechanical feed.

- No delays in production
- Greater output with same or less power
- Uniform product every day
- Lower drying costs

The most plastic, wet, clayey materials will not slow production. Has saved the cost of 10 men for one company.

And because the breaker plate is adjustable to the hammer points, quality and size of production can be controlled.

DIXIE engineers will gladly cooperate with you on your present crushing problems to effect an immediate solution.



DIXIE MACHINERY MFG. CO.

4204 Goodfellow Blvd. St. Louis, Mo.

California (*continued*)

Angeles concern headed by F. W. North, has installed a dragline dredge and a 300-hp. diesel power-generating plant on its gravel holdings 6 miles north of Camptonville, Yuba County. A large yardage of gold-bearing gravel extending to depths of 125 ft. is available for mining and washing. Operations are directed by O. H. Keyser, superintendent.

★According to a communication received from W. J. Balfrey, owner of the Siskiyou lead mine, in Siskiyou County, a body of lead-zinc ore carrying values in gold and silver has been brought to light as a result of a mineral survey carried out and completed recently by Burton J. Westman, geologist and formerly a member of the Michigan Geological Survey.

★Alfred L. Merritt, well-known mine operator, whose organization worked the Cherokee gold property at Greenville, Plumas County, until stopped by WPB order L-208, has leased the Brush Creek gold mine from Fred Cassidy, of Nevada City, and plans to start limited development work in the near future. The mine is near Goodyear's Bar, in Sierra County, and has been worked during the last two years on a limited basis, with a one-stamp treatment plant handling about 100 tons of ore a month.

★Limited exploration operations are in progress at the Nellie Koho gold mine, near Mt. Bullion, Mariposa County, acquired recently under lease and option agreement by Ruth-Bobby Mining Co., headed by L. R. Lurie and Felix Kahn, of San Francisco. Preliminary work completed since acquisition of the property includes retimbering the shaft, construction of a surface plant, and installation of hoisting and mining equipment. Current activities are centered in sinking the shaft 150 ft., to be followed by drifting on the vein north and south. The mine was formerly worked by Harold Hansen, superintendent of Pacific Mining Company's Pine Tree mine, in Mariposa County, and associates, who subsequently extended a lease to R. B. Lamb, who in turn transferred it to the present operators. W. B. Brule is general manager, and operations are directed by R. B. Lamb. Seven men are employed.

★Nearly 500 men are reported to be working at the properties of Empire Star Mines Co. Ltd., J. R. C. Mann, general manager; Idaho Maryland Mines Corp., Neil O'Donnell, general manager, and the Spring Hill mine, C. C. Cushwa, general manager, in Grass Valley, Nevada County. Production handled at the mills of the first-named two companies following recent authorization by WPB for limited operations is said to average 250 tons a day. The companies recently also signed a two-year agreement with the independent Nevada County Mine Workers' Protective League, providing increased wage scales for possible increases in gold prices to $40, $45, and $50 respectively. Under the contract signed, the

miners are assured a basic wage of $6.74 per day with gold at the present price. If the price of gold should be raised to $40, the wage rate will be $7.17, $7.61 for $45 gold, and $8.04 for $50 gold.

★The California Pyrophyllite Co., Los Angeles, is installing equipment to work aluminum silicate deposits 24 miles north of Laws in the White mountains. The property, lately acquired from Glen Colton, of Bishop, will be worked through open pits and tunnels. The company will employ more men when operations reach capacity, and will ship its product to Pacific Coast and Eastern manufacturers.

★About mid-September fire destroyed the office, blacksmith, and machine shops of the Eagle-Shawmut mine, Chinese Camp, Tuolumne County, causing a loss of about $10,000, according to Manager D. C. Peacock. The property is being operated by Miller and Clemson, Los Angeles, milling zinc ore trucked from the Penn mine, Calaveras County.

WASHINGTON

Power line to be built from Canadian boundary to Metaline Falls—Aluminum output down

Washington Water Power Co., headquarters Spokane, has announced it will build a 60,000-volt power line from the Canadian boundary 10 miles to the Grandview mine and mill at Metaline Falls. Surveys have been made and the right-of-way has been secured, part of it through the Kaniksu national forest, and construction is expected to be under way early in November. Power will be brought in from the Nelson, B. C., plant of Kootenay Power & Light Co. over a wire built down from the Emerald tungsten mine, on the south fork of the Salmon River a short distance north of the boundary, where a large mill was built last year but never operated. The power to be brought in is for the Metaline Mining & Leasing Co., which operates both the Grandview and its own property for the American Zinc, Lead & Smelting Co. The power will be available for other customers in Metaline Falls, and it is possible it will be extended west into northern Stevens County, where several mining operations would like to use it. There is considerable rivalry between the Washington Water Power Co. and Bonneville Administration for the northern Stevens and Pend Oreille counties' field. If the private company gets control of the field and needs additional power, it is presumed it can get it from the Bonneville Administration and Grand Coulee power plant.

★Ed Davis, State Director of Conservation and Development, and R. P. Newland, District Highway Engineer, were in the Metaline district in August, conferring with the county commissioners on proposed mine-to-market roads. Under the State law such a

FEED

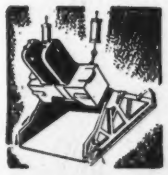
WEIGH AND FEED

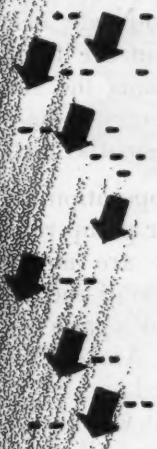
CONVEY

PACK

COOL

DRY


SCREEN



JM

Any material--ranging from four-foot hunks to light powder --under

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(Patented)

● These electrically-controlled vibrating units are instantly adjustable—free from wearing parts—require no lubrication. Let us show you how efficiently they can operate in your preparation plant—how to handle more than 300 different types of material by this superior method. Catalog No. 750.

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THE JEFFREY MANUFACTURING COMPANY

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Pumps With Overhead Motors Handle Slurry at Ore Smelting Plant

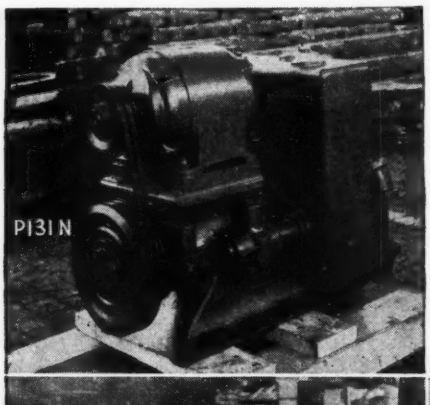
A zinc-lead smelter recently installed 24 Amsco-Nagle centrifugal pumps in an ore treating operation for passing the slurry through various stages in the production of these essential metals.

As continuous operation is important, delays for pump repairs and replacements are not welcome, yet the action of such slurries on "water-end" parts is severely abrasive. Amsco-Nagle pumps are designed and built for that kind of service, with the parts that come in contact with the material being made of the metal affording the highest resistance to the specific abrasive or corrosive conditions encountered. Their performance in the process and metallurgical industries has led to increasing applications and installations.

Amsco-Nagle pumps are ideal for slurry-handling because of accessibility of stuffing box and impeller, and wide impeller clearances which facilitate passage of heavily laden liquids. Overhead motor mounting permits installation in confined areas, while at the same time making the motor more accessible and less subject to flooding.

Some of the 24 pumps for this installation are shown in the pictures.

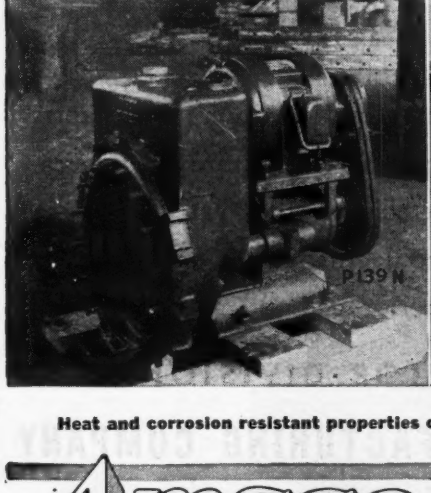
Amsco-Nagle pumps are made in two horizontal and three vertical types and in sizes from 3/4" to 16". Ask for Bulletin No. 940.

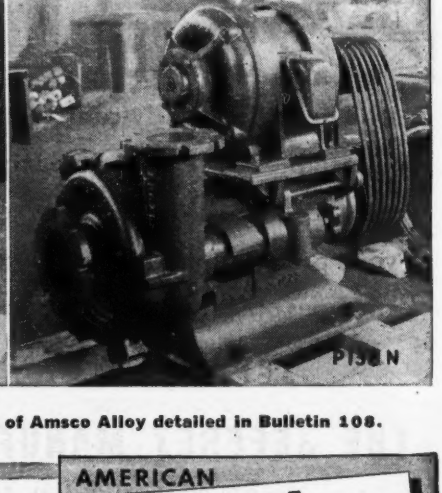


P-131-N—1½" Type A, frame 10, overhead drive Amsco-Nagle pump, for handling slurry in the production of zinc, lead and cobalt.

P-139-N—2" Type A, frame 10, overhead drive Amsco-Nagle pump.

P-138-N—5" Type T, frame 14, overhead drive Amsco-Nagle pump.





Heat and corrosion resistant properties of Amsco Alloy detailed in Bulletin 108.

Amsco

AMERICAN MANGANESE STEEL DIVISION
Chicago Heights, Illinois

AMERICAN Brake Shoe COMPANY

FOUNDRIES AT CHICAGO HEIGHTS, ILL.; NEW CASTLE, DEL.; DENVER, COLO.; OAKLAND, CALIF.; LOS ANGELES, CALIF.; ST. LOUIS, MO.
OFFICES IN PRINCIPAL CITIES

Washington (*continued*)

road was built this spring to a tungsten property on Harvey Creek, tributary of Sullivan Lake, and another such road from the west side of the Boundary Highway, near Z Canyon, to the Columbia claims. Ore is being trucked from the latter holdings to the mill of Pend Oreille Mines & Metals Co., at Metaline Falls. Another such road is under consideration to reach the Coffin claims, northwest of Ione. This property is held by A. E. Torelle, of Spokane.

★Federal Housing Authority is proposing to dispose of the temporary housing built for miners at Metaline Falls. Only a few miners have taken advantage of these living quarters. The dormitory has accommodations for 36 single men. It is proposed to transfer the property to some other government agency, or sell it to private parties, or to some municipal, county, or state agency. If no sale is made, it is said the buildings will be demolished by the government.

★Who shall receive the $30,000 which the government will pay for the dolomite quarries in Stevens County is a difficult and complicated issue which awaits the decision of Judge Lewis B. Schwellenbach in the Federal Court, in Spokane. Testimony in the case occupied several days in August. Four claimants are involved in the ownership of the 340 acres of ground and two and a half miles of right-of-way from the quarries at Marble, 8 miles south of Northport, to the Great Northern Railway. This dolomite is shipped to the Electro Metallurgical Co. magnesium plant, at Spokane.

★Production of aluminum at the Mead plant, in Spokane, will be curtailed 6,000,000 lb. per month, following a government reduction of 30,000,000 lb. throughout the United States. However, the production at the Mead plant has never reached its quota, and it is said as a result it will not be necessary to lay off any men. Under the reduced schedule the plant will produce approximately 12,000,000 lb. a month. The Spokane plant claims to be producing aluminum for 11.87c. a pound, which it is said is cheaper than the price at any other plant in the United States, due primarily to cheap power.

★The Spokane regional office of the U. S. Geological Survey is mapping the geology of the drilling being done by the U. S. Bureau of Mines in five districts in the State of Washington. The following parties are in the field: Edward Sampson with five men, mapping the geology of the lead-zinc deposits in the Metaline district of about 40 sq.mi. C. D. Campbell, formerly professor of geology at the Washington State College, is in charge of the Northport-Colville lead-zinc area. S. C. Creasey has a party in the nickel area on the Columbia, near Winesap. R. L. Nichols is mapping the high-grade clays at Durham, King County. Prof. G. E. Goodspeed, of the University of Washington, is mapping iron deposits and

making a magnetometer survey of the Buckhorn Mountain-Curlew district.

★The proposed cancellation of hundreds of mining claims has brought five engineers from the U. S. Department of the Interior to Nespelem, from which point they are examining mining claims on the south half of the Colville Indian Reservation, checking the records back to 1899. The Colville Indian Tribal Council has refused to sanction the withdrawal of its land from entry as provided in an act of Congress. The withdrawal has been in force by an executive order since 1934. It is said some of the mining claims against which cancellation action is pending are owned by members of the tribe.

★Barclay Goodsell, Spokane mining engineer, has been elected president of Nespelem Consolidated Mines Co., and E. P. Twohy is secretary-treasurer. The company's property, near Nespelem, is under lease to G. H. Beggs, who plans to resume operations as soon as men and materials are available. The property produces high-grade silver ore.

★An increase of 15 to 20 percent in employment is expected after the war by industries in Washington, Idaho, Oregon, and Utah, according to reports made to the Committee for Economic Development in Spokane the latter part of August. J. B. Haffner, manager of Bunker Hill & Sullivan Mining & Concentrating Co., at Kellogg, Idaho, predicted employment in northern Idaho mines after the war will be 40 percent higher than in 1940. He said orderly liquidation of metal reserves accumulated by the government during the war is needed to promote rapid resumption of the Idaho mining industry, which now operates at less than 50 percent of capacity because of lack of manpower. The mines, he said, are equipped to resume full production within a matter of a few days.

MICHIGAN

Texas flint pebbles used for regrinding at C & H—Concern expressed for postwar outlook

★E. R. Lovell, vice president and general manager of Calumet & Hecla Consolidated, in a statement relative to postwar prospects said:

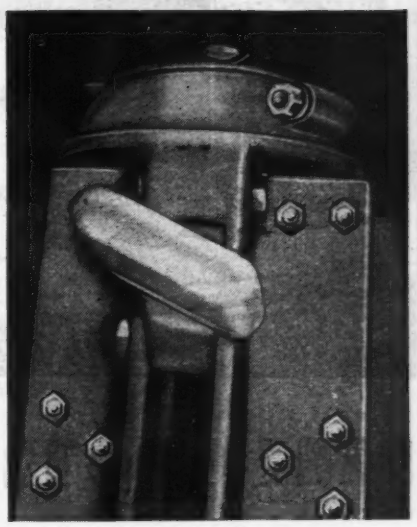
"The management of Calumet & Hecla has given a lot of thought to the future and is doing everything it can to prepare for whatever conditions may confront the company when peace is declared. There are many unknown factors that make this a serious and complicated question. What about the gigantic stocks of copper and brass, in all forms, that will exist when the fighting is over? Will they be frozen and held for a future emergency or will they be dumped on an unwilling market as was done after the first World War? Will low-cost foreign copper be kept out of the United States by a tariff wall,

EAGLE
LOG WASHERS

One of the features which make Eagle Log Washers outstanding in economical performance is their bearings.

All the end thrust of the log shafts is taken by Timken roller bearings, which operate above the water line. There is absolutely no chance for grit to wash into the bearing, as it is properly sealed as shown in the picture. The ball-and-socket type bearing cartridge is held in position with a centering pin of ample size to transmit all thrust loads to the heavy end casting. Shims between the cap and the housing effectively compensate for any wear.

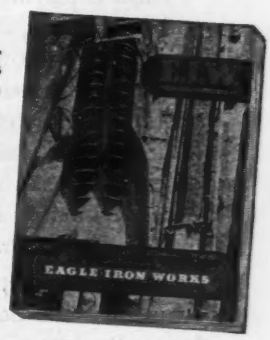
At the lower end, the shaft rests in Marine Type bearings, made of impregnated fabric, which have proved superior to anything yet developed for this application. All wear is taken by replaceable wearing sleeves installed on the shaft. These bearings are water washed and lubricated, eliminating excessive wear and expense. Clamped to the shaft just back of the bearing is a protector which seals the bearing, and also holds the pressure in the bearing and keeps particles in solution from washing into the water groove. Eagle engineers perfected this bearing arrangement, which is an exclusive feature—and one of a number of points of superiority —of Eagle Washers.



Protector which seals bearing and prevents slurry from entering bearing.

Your Guide to Greater Output at Lower Cost

Catalog No. 44 contains complete information on Eagle Classifying and Dewatering Equipment. Send for your copy.



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Specialized Mining Equipment
CLASSIFIERS — LOG WASHERS
DEHYDRATORS — CAGES
EAGLE IRON WORKS
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"SERVING INDUSTRY FOR OVER SEVENTY YEARS"

Historic coin bank from an old New England collection

BANK OF OUR FOREFATHERS

The early colonial was a stickler for thrift! Saving was made a game and banks like the one pictured here were a conspicuous part of every household. Ingeniously constructed they were, too, for they were made so that once the money was inside you could not take it out unless you broke the bank . . . and woe betide the one committing such a sin!

Thrift is playing its same important role in today's war and the pennies, dimes, and dollars of true Americans are shaping and powering mighty dreadnoughts, miracle Fortresses of the air and an endless stream of other Victory-making war material. Our country is dotted with hard-hitting production plants . . . monuments to the savings of each of us who, day after day, is helping to make America a better, a happier, and a safer place in which to live . . . savings that finance the war . . . with War Bonds.

War Bonds keep our Boys on the march . . . to Victory. Save for them. Start a family War Bond game in your home. Pool your pennies, nickels, dimes and dollars just as our forefathers did back in Revolutionary days. Set aside a specified time each week or month to turn this saved-up money into fighting War Bonds. Then, when the rainbow of Peace beautifies America's horizon, those dream things of tomorrow can be yours . . . they can be paid for with the War Bonds you buy today.

A War Bond Message Designed and Contributed by
Buell Engineering Company, Inc., New York

buell
DUST RECOVERY SYSTEMS

MICHIGAN (*continued*)

or will the government return to a policy of free trade, with the inevitable elimination of high-cost American producers, such as Calumet & Hecla? What wage scale and supply costs will prevail? Will the price of copper be profitable, or will the government insist that the prewar 12-cent level is high enough? These are a few of the important problems that must be met. At all costs, we must avoid a disastrous shutdown such as occurred in 1921 and again in 1932. Government control, without government domination, can go far to prevent such a costly repercussion."

★Flint pebbles from Texas are being used in the Hardinge mills at the regrinding plant of Calumet & Hecla at Lake Linden. The best pebbles come from Denmark and France, and at the time of the first World War Calumet & Hecla had a four-year supply on hand. The company was not so well stocked at the beginning of the present war. Various domestic substitutes were tried, without success until the company was able to find an ample supply of flint pebbles in Texas. A large tonnage is needed for 64 Hardinge mills, each of which consumes approximately 200 lb. of pebbles per day.

★Calumet & Hecla has been advised by the Solid Fuels Administration that its allowance of coal has been reduced by some 20,000 tons for the current year. The company has gone to considerable expense to get the greatest possible use out of the coal to be had. Hagen draft controls, which have been in use at the Ahmeek mill boiler house for several years, have been installed in the boiler houses at Lake Linden and North Kearsarge. Similar installations will be made at the Centennial and Ahmeek plants as quickly as possible.

★Production from No. 4 North Kearsarge shaft of Calumet & Hecla is at the rate of 1,400 tons of copper rock per day. This shaft has had a varied career. Sinking was started by Osceola Consolidated in 1907. Operations were carried on until November, 1920, when the mine was shut down, due to the low price of copper. Operations were resumed in July, 1929, by Calumet & Hecla, this shaft having been one of the units which formed the Calumet & Hecla Consolidated Copper Co. Operations were again suspended on Dec. 31, 1931. During September, 1937, the shaft was reopened, when copper sold above 15c. per pound. By March, 1938, the price had declined to 9c., at which time operations were suspended. The shaft was reopened again in February, 1942, to further the war effort.

★H. S. Peterson, formerly superintendent of Michigan mines for the Jones & Laughlin Ore Co., has been made manager of mines in the Michigan district, thus separating the Lake Superior field into two districts, with R. McL. Johnson manager for the Minnesota mines. Because of a new program of research and exploration,

the office at Ishpeming has been enlarged and a staff of engineers added.

IRON COUNTRY

Season's iron-ore shipments through August up 4 percent compared with last year

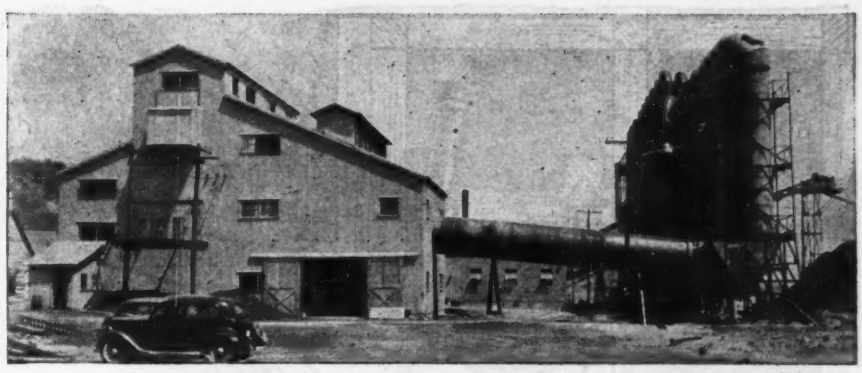
★Exploration at the Wakefield mine, on the Gogebic Range, has been discontinued, with no additional ore developed. The mine is exhausted, and the surface equipment has been offered for sale. This property has been worked over a period of 30 years, shipping more than 12 million tons of high-grade iron ore.

★A spectacular salvage job was completed recently on the freighter "George M. Humphrey," a 600-ft. vessel, carrying 14,000 tons of iron ore, that sank in the Straits of Mackinac on June 15, 1943, after collision with the freighter "D. M. Clemson." Because she sank to a depth of 78 ft., the owners abandoned her and the underwriters were unwilling to attempt salvage. Two months after the sinking, Capt. John Roen and his crew undertook the job by first removing the ore with derrick and clamshell bucket, then lowering a barge half the size of the vessel directly over it, and filling the barge with water. After barge and boat were laced together, the barge was pumped out. As it rose, the freighter came with it, and the two were towed toward the beach. Six times this was repeated. The boat was moved a total of 8,000 ft. until it now lies near the State Ferry dock at Mackinaw City ready to be pumped out and floated again after minor repairs to pilot house and hull.

★The influence of union officials in operation of iron ore mines was shown recently when No. 3 shaft of the Davidson Iron Co., Iron River, Mich., was shut down for a week to permit improvement of the ventilation system. On complaint of Ramsey Wilson, C.I.O. representative, to F. J. Carlson, county mine inspector, that bad air conditions had developed due to leaking sulphur fumes from unsealed openings, the inspector ordered the ventilation system repaired. A 16-in. ventilating tube was installed from surface to 5th level to correct the trouble.

★The Cliffs Power & Light Co., a subsidiary of the Cleveland-Cliffs Iron Co. that supplies the electric power needed for all mines on the Marquette Range in Michigan, is making improvements at its Silver Lake storage dam, 20 miles north of Ishpeming, Mich. To raise the dam another five feet, 1,000 cu. yd. of concrete was poured, impounding needed additional water. To care for improvements that may be added in the near future, the highway to the dam has been put in good condition. J. D. Preston is manager.

★According to tables compiled by the



Norblo Dust Control Gives The Basis for Good Public Relations

● Dust and fume control has become an essential element in post-war modernization of the smelting, mining, rock products and chemical industries. In many cases material salvage soon pays for the dust collecting equipment. But even without salvage and merely as good community housekeeping, dust collection justifies itself economically. Instead of being a nuisance continually subjected to hostile and political attack, the plant becomes a welcome industry, labor relations are improved, property values increase, tax relations are simplified . . . Norblo engineers can help you with your post-war planning if it includes, as it should, modern dust and fume control for any purpose. Or write for Norblo bulletins illustrated below.

Norblo
DUST COLLECTION SYSTEMS
THE NORTHERN BLOWER COMPANY
6410 BARBERTON AVENUE CLEVELAND 2, OHIO

Operate Measuring Pockets Economically
WITH
NOPAK
AIR CYLINDERS

NOPAK 3-and 4-Way Valve for positive control of Air Operated Equipment.

NOPAK Model E Heavy Duty Cylinder with Pendulum Mounting which permits oscillating action. 6 standard NOPAK Cylinder Mountings meet practically all application requirements.

Here is another typical example of how NOPAK Air Cylinders can be used to lower ore-handling costs, step-up production and promote safety in mining operations. The sketch suggests how two NOPAK Model E Heavy Duty Air Cylinders can be used to open and close an ore pocket.

The cylinder at the right operates the finger-gate which permits the ore to flow into the measuring pocket. Cylinder at the left raises and lowers the vertical gate which controls the flow of ore from the measuring pocket into cars or skips. In this type of installation, the measuring pocket is often built to hold exactly one car or skipful of ore. This prevents spills, keeps haulage-ways clean, eliminates clean-up labor.

Of course, there are many other lifting and lowering or pulling and pushing jobs in most mining operations which NOPAK Cylinders can handle efficiently. For details of their rugged construction, exclusive design features and operating advantages write for Bulletin 82A. Mining engineers find it very helpful in adapting NOPAK Air Cylinder power to their needs, with Nopak valves for control.

GALLAND-HENNING MFG. CO.
2761 S. 31st ST., MILWAUKEE 7, WIS.
Representatives in Principal Cities

NOPAK VALVES and CYLINDERS
DESIGNED for AIR or HYDRAULIC SERVICE

Iron County *(continued)*

Lake Superior Iron Ore Association, the shipments of iron ore for August from Lake Superior showed a decrease of 12 per cent from last year—12,288,253 tons, compared with 13,976,770 tons. Because of the decrease in demand following reduction of steel orders, it was a surprise that the decrease was not larger. For the season to Sept. 1 the increase for this year is 4.23 per cent, the total tonnage being 54,574,155, compared with 52,359,474 tons for last year. All mines, both underground and open pit, are now on a 40-hour week for labor.

CANADA

Record for 1943 shows that Canada produced substantial part of world's minerals

★Canadian producers have sold 30,000 tons of copper in the first nine months this year to American consumers, at the U. S. price plus exchange. Stocks of copper in September were reported to be about normal, and iron and steel scrap prices were considered to be fairly secure in Canada, where declines have been less threatening than in the United States. Reduced Canadian production of nickel, copper, lead, and zinc has been caused primarily by shortages of mine labor. Smaller demand for these metals appears to be establishing a close adjustment with supply. In the case of molybdenum, all production has been suspended except at the Siscoe-operated La Corne property. Canadian output of chrome ore also has been shut down, affecting the Chromeraine project of Wartime Metals Corp., Black Lake, southern Quebec, which was closed in August after reaching maximum daily production of 350 tons. Substantial ore reserves are reported for each of the properties where operations have been terminated.

★A union agreement has been signed between the CIO and Sheritt Gordon Mines, in northwestern Manitoba, 40 miles from Flin Flon. Unlike union agreements adopted at other Canadian properties, no limit is stipulated in Sheritt Gordon's contract for deductions covering dues, assessments, and fines. In the presence of a union official, the employee signs a deduction slip, which may be revoked at any time. The agreement includes the voluntary check-off and other clauses similar to the union contract recently completed with International Nickel Co. of Canada.

★Non-ferrous smelting and refining in Canada last year expanded 95 percent in the value of its products, compared with output in 1939, as reported by the Dominion Bureau of Statistics. This industry is represented by 9 companies operating 16 plants and employing 26,749 workers, as against 12,449 in 1939. The value of ore treated increased from $155 million to $318 mil-

lion, due to larger output of nickel, lead, and zinc, and to expanded imports of bauxite for treatment at Arvida, Quebec. Copper ore was lower in volume but slightly higher in value. There was an increase of almost 80 percent in the volume of non-ferrous ore and concentrate treated in Canada.

It is estimated that Canada in 1943 produced 95 percent of world nickel supplies, 20 percent of the aluminum, 11 percent of the blister and anode copper, and 9 percent of the refined lead and zinc. In the first half of 1944, gold output declined 23 percent, lead dropped 36 percent, zinc 14 percent, nickel 8 percent, and copper 4 percent. In the past year the price of non-ferrous metals has increased substantially in Canadian funds, after holding closely to the levels prevailing Sept. 1, 1939. In 1943, Canadian zinc advanced 18 percent in price, while copper went 16 percent higher than in 1942, and lead was up 10 percent. Prices of raw metals as well as of metal products were lower in 1939 than in 1929, and the gross value of smelted and refined non-ferrous metals in 1942 was more than four times greater than in 1929.

ONTARIO

★Stripping operations on the "B" orebody on the property of Steep Rock Iron Mines, Ltd., near Atikokan, in western Ontario, proceeded efficiently during August with both excavating and hydraulic equipment. It is estimated that more than 225,000 cu.yd. of material was handled in that month. Heavy rains during the month caused the entrance of superficial material composed of black muck and disturbed silt into the dredging area, and the ore production schedule tentatively drawn up for August could not be met. The ore disclosed in August was not sufficiently large in area to permit mining operations, but the shovels and draglines have been cleaning up the ore surface. When the dredge has been lowered an additional 10 to 15 ft. an adequate tonnage of minable ore will be made available quickly. At the time of writing, mining operations were expected to begin in September. The crushing and loading terminal has virtually been completed. Railway construction to the spur from the Atikokan station has been so advanced that initial shipment can readily be made.

★Robert J. Jowsey, president of Dominion Magnesium, Ltd., has announced that the plant at Haley's is continuing production at an average monthly rate of about a million pounds, compared with current U. S. output of about 14,000,000 pounds monthly. Production at Haley's early in 1943 rated at 600,000 pounds monthly. Dominion Magnesium owns the Pidgeon patents on a process for extracting magnesium from dolomite, at costs, reported several months ago, averaging 21c. per pound. The purity of the Dominion Magnesium product is stated to be higher than average output of U. S. plants. Canadian magnesium

The Blueprints for your Metallurgical Plant Are LOCKED INSIDE the Ore Samples

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1. What kind and size mill do we need to recover values at maximum profit?
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We are prepared to answer such questions, reporting fully on your ores and giving detailed estimates on suitable mill construction.

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2
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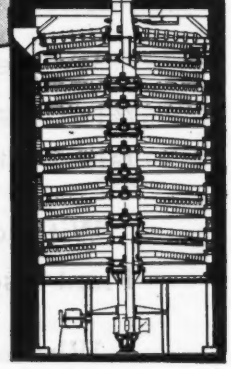
3
A typical Nichols Herreshoff Multiple Hearth Furnace. Known the world over for economical and efficient thermal processing of many materials.



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Canada *(continued)*

is being sold in England, where steady demand persists. Largest stockholders in Dominion Magnesium, holding world patents on the Pidgeon process, are Bobjo Mines and God's Lake Gold Mines.

★Midlothian Lake, west of Matachewan and Kirkland Lake, is the center of a staking rush following gold discoveries on claims held by Laroma Midlothian Mines. The new showing is to be tested by a series of diamond-drill holes under the direction of Dr. W. F. James. Prospectors are active throughout the area in staking claims, several groups having been acquired by mining companies. The movement of men into the area has made it necessary to keep two planes in service from Matachewan.

★Cochenour Willans Gold Mines, in the Red Lake area, reports opening a new ore horizon on the 375-ft. level. This structure lies south of the main ore zone and is reported to have good possibilities for both grade and tonnage. Flat drill holes put down several months ago gave indications of the new ore. At a point 800 ft. farther to the east other promising indications have been found near the new Kelson shaft, making this block of undeveloped ground a promising locality for further exploration. W. P. Mackle is mine manager.

★Reports from McKenzie Red Lake Gold Mines describe a 300-ft. section of good-grade ore that has been opened on the bottom 1,250-ft. level, in the northeast section of the property. In this area structural conditions appear to be more favorable than any so far disclosed at higher elevations, and a winze is to be put down in the footwall of the ore zone to a depth of 1,650 ft., to advance the exploratory program. Ore of good grade has been indicated in this area by a series of closely spaced drill holes. Labor shortages have recently necessitated a mill reduction from 240 to 220 tons a day. Production last year averaged $11.08 a ton. J. L. Ramsell is mine manager and Fraser D. Reid is vice president.

★In his annual report for Lake Shore Mines for the year ended June 30, 1944, Albert Wende, president, states that 267,698 tons averaging $16.80 a ton was milled, compared with an average value of $16.35 a ton for the 338,810 tons treated in the previous year, and working capital improved $139,957, to $4,471,841, and net profits declined $396,206, to $1,521,977. Total costs per ton increased from $10.58 to $11.04. The managing director and superintendent, A. L. Blomfield, reported good ore in important volume had been developed on the 5,325-ft. level for a length of 536 ft. On the three levels down to 5,700 ft. more limited work has exposed short sections of new ore, located in the No. 1 and No. 2 zones and in subsidiary veins. Diamond drilling has been used in exploring the subsidiary structures in order to con-

centrate mine labor available for drifting operations to the main leads of the veins on the lower levels. Extensive development on the lower levels from 4,575 down to 6,075 ft. remains to be done after labor becomes available. The one heavy rockburst occurring last year was located in an old section of the mine workings and no damage resulted. Although severe rockbursts are less frequent than in former years, research work is being continued for the purpose of developing equipment that will be effective in predicting the bursts. An immediate objective in dealing with the rockburst problem is to develop many levels ahead of the bottom of active mining operations, which would require restricting daily output to about 1,200 tons.

QUEBEC

★Announcement of the formation of Vincent Mining Corp., Ltd., has been made by Norman Vincent, president, who also heads Mica Co. of Canada, Ltd. The new setup is a holding company capitalized at $5,000,000, with working capital stated to be $250,000. Under control of the new organization are included Mica Corp. of Canada and some 13 companies located in Alberta, Quebec, and Ontario, and controlling claim groups on which gold possibilities are in the preliminary stages of exploration. One of these properties, held by Rambull Gold Mines, Ltd., is in Figuery Township, 8 miles south of Amos, Quebec, where a gold discovery last July attracted wide attention. C. O. Stee, consulting engineer, has recently reported on a promising new vein discovery and has arranged for use of a second diamond drill in carrying out exploratory work.

★Manterre Gold Mines has begun drilling on its Mud Lake property adjoining the Belleterre Quebec, which is controlled by McIntyre Porcupine. J. P. Norrie, mining engineer, has reported to the company that the No. 12 Belleterre vein should enter the Manterre, formerly known as the McManus-Morrison, at a depth of 600 ft. Other Belleterre veins are expected to run into Manterre ground from both east and west.

★Beattie Gold Mines Ltd. is to cease operations for a period of about six months, due to the impossibility of continuing profitable work under present conditions of labor and supplies. During the shutdown, development will be concentrated on the Donchester orebody, where a new shaft has been sunk and a surface plant completed. Arsenic production will continue from stocks in storage, and the removal of clay from the Beattie mine will go forward. It is expected that by spring the total production can be run up to 1,500 tons daily, and that profitable operations can be resumed.

★Wasa Lake Gold Mines is continuing diamond drilling on the easterly end of its property in Beauchastel Township, having previously delimited the ore zone at the westerly end. It is reported that

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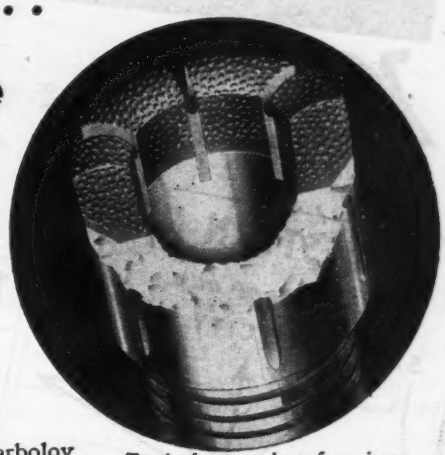

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10FM-1

Canada *(continued)*

ten holes have cut the main orebody at 200 to 450 ft. in depth.

★Powell Rouyn Gold Mines, Ltd., whose property adjoins Noranda Mines, in Rouyn Township, has practically completed sinking its main shaft 500 ft. to the 2,600 level. Owing to labor shortage, production is down from 27,000 to 16,000 tons per month and is likely to be dropped to 350 tons per day. In the meantime, efforts will be directed toward development work in order to put the property in good position to resume full production when labor is more plentiful. A geophysical survey of the unexplored part of the property is being made and will be followed by drilling.

BRITISH COLUMBIA

★Gold discoveries near Whitesail Lake, in Tweedsmuir Park, continue to attract the attention of exploration companies and individual prospectors. International Mining Corp. (Canada), Ltd., has staked promising ground adjoining the Harrison group, on which Pioneer engineers made the original discovery. Leta Explorations, Ltd., and Premier Gold Mining Co., Ltd., have also obtained claims adjoining the Pioneer property. A short distance away Privateer Mine, Ltd., holds several parcels of ground. St. Eugene Mining Corp., Ltd., Ventures subsidiary, has holdings near Eutsuk Lake, a short distance south of the Whitesail Lake district. Tweedsmuir Park has been designated as Class B and therefore is open to free miners (as defined by the "Mineral Act" and the "Placer-Mining Act") to prospect for minerals and to locate, acquire, or occupy mineral claims under the provisions of the previously mentioned Act. In the case of trails and cabins or camps which are located outside of the mineral claim, this occupancy or use must be legalized and covered by a Park Use Permit.

★Silbak Premier Mines, Ltd., Portland Canal district, received net smelter returns of $49,314 for August production, recovered from treatment of 5,256 tons of ore, averaging 0.25 oz. gold and 2.15 oz. silver per ton. Estimated operating profit before write-offs was $4,360.

★Privateer Mine, Ltd., former Zeballos district gold producer, has dropped its option on a group of Iceland spar claims, in the Kamloops mining division. Development work has been suspended on the Dome Mountain gold group, in the Omineca district, for the reason that priorities for both labor and materials will be necessary to carry on further.

★A trial shipment of gold-copper ore has been made to the Tacoma smelter from the Little Billie mine, operated by Industrial Metals Mining Co., Ltd., on Texada Island. The company had considered making regular shipments, but such a program has been deferred in the hope that Ottawa will approve plans for the construction of a mill on the property.

★During 1943, Britannia Mining & Smelting Co., Ltd., Howe Sound subsidiary, mined and milled 849,147 tons of ore to produce pyrite and copper concentrates yielding 16,436,868 lb. copper, 10,922 oz. gold, and 73,645 oz. silver. Development work included 1,330 ft. of drifts, 1,158 ft. of crosscuts, 4,548 ft. of raises, 1,578 ft. of powder-blast workings, 47 ft. of winzes, and 1,116 ft. of shafts. In addition, 9,772 ft. of diamond drilling was done. Joint application has been made with the International Union of Mine, Mill and Smelter Workers to the National War-time Labour Relations Board for changes permitting a more generous holiday schedule in the labor agreement now up for renewal.

★Bralorne Mines, Ltd., Bridge River district, will pay Dividend No. 40, of 20c. per share, plus an extra dividend of 10c. per share, Oct. 14 to shareholders of record Sept. 21. The Takla mercury mine was closed Sept. 13 following cancellation of contract by Metals Reserve Co.

★Encouraging development of the "27" vein on the 25 level of the Pioneer gold mine has suggested substantial additions to ore reserves. Little ore in this vein has heretofore been included in reserves. The vein lies at right angles to the Countless vein, from which virtually all Pioneer production has originated. Hoisting of ore has been resumed following completion of repairs to the shaft headframe, and milling of the accumulated ore is now in progress.

★Interests closely identified with Jason Mines, Ltd., Ontario gold-mine operator, have acquired an option on the upper Bridge River property of Bridge River Consolidated Mines, Ltd. It is proposed to drive long, exploratory, diamond-drill holes from the canyon of the Hurley River, about 800 ft. below any previous exploration.

★Shareholders of Congress Gold Mines, Ltd., Bridge River district, have authorized directors to increase capital from 2,000,000 shares to 4,000,000 shares of $1 par value. An offer from St. Eugene Mining Corp., Ltd., Ventures subsidiary, is now before directors.

★August production of Cariboo Gold Quartz Mining Co., Ltd., was valued at $34,919, from 2,595 tons of ore.

★August production of Island Mountain Mines Co., Ltd., Newmont's Cariboo district subsidiary, was 796 oz. gold, valued at $30,646, from 1,706 tons, averaging 0.47 oz. gold per ton.

★Granby Consolidated Mining, Smelting & Power Co., Ltd., produced 22,892,724 lb. copper, 6,404 oz. gold, and 156,507 oz. silver during the year ended Dec. 31, 1943. Development work consisted of 5,945 ft. of drifting and crosscutting, 9,196 ft. of raising, 5 ft. of sinking, and 7,255 ft. of diamond drilling. Production was obtained from the Copper Mountain mine in the Similkameen mining division.

★During the year ended Dec. 31, 1943, Kelowna Exploration Co., Ltd., oper-

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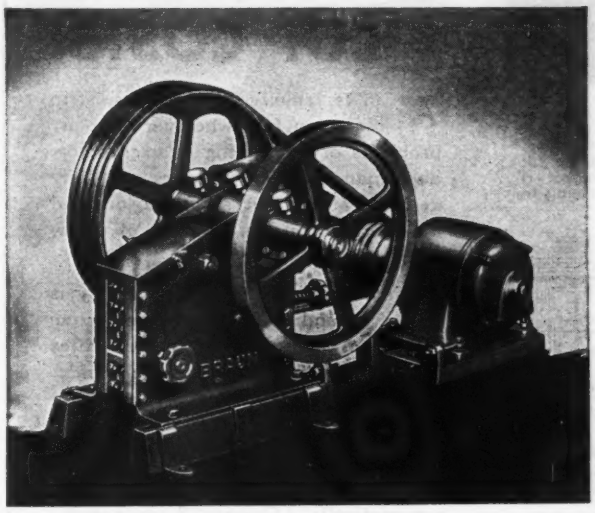

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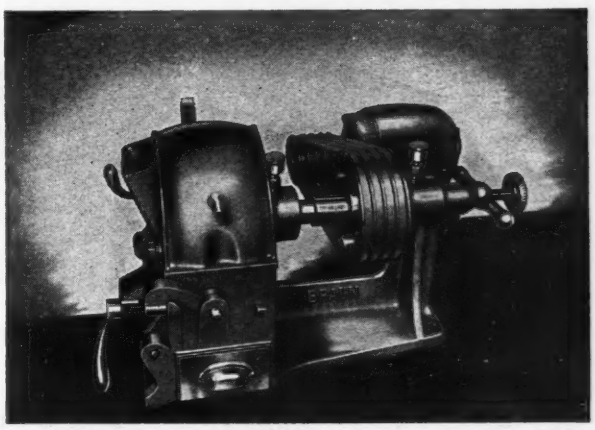

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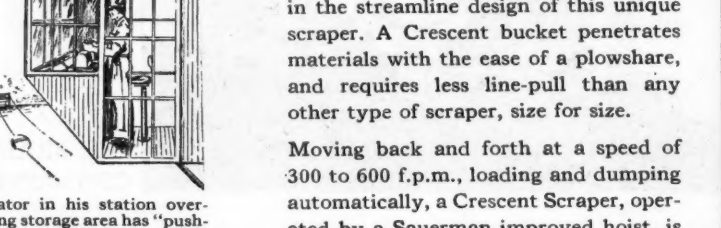

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Canada (*continued*)

ator of the famous Nickel Plate mine, at Hedley, in the Osoyoos mining division, produced 23,344 oz. gold, 2,405 oz. silver, and a quantity of arsenic and copper, all of which brought revenue of $814,982. Production was achieved through the treatment of 67,640 tons of mined ore and 16,966 tons of recovered slime. Development work consisted of 1,364 ft. of drifting, crosscutting, and raising; 73 ft. of sinking; and 6,410 ft. of diamond drilling.

★Treatment of the high-grade ore now being mined on the surface of the Good Hope (Wheeler) group, under option to Hedley Mascot Gold Mines, Ltd., Osoyoos mining division, will be delayed through the necessity of constructing a section of new road to the property. Ore will then be hauled to the former Canty mine bunkers for treatment in the Mascot mill.

★Sheep Creek Gold Mines, Ltd., will pay Dividend No. 34, of 3c. per share, Oct. 14 to shareholders of record Sept. 30. During the fiscal year ending May 31 last, net profit from gold-mining operations was $88,436. At the same time the wholly-owned subsidiary, Zincton Mines, Ltd., earned an estimated net profit of $279,126. The Zincton mill treated 91,491 tons of ore, producing 15,294 tons of concentrate, containing 17,497,463 lb. zinc, during the fiscal year. Zincton ore reserves were estimated as of May 31, at 170,375 tons, a slight reduction from the estimate of the preceding year. Sheep Creek reserves were estimated at 100,397 tons, averaging 0.367 oz. gold per ton. Net current assets, excluding value of mines and equipment, show a surplus over current liabilities of $1,077,848, equivalent to 57c. per share of stock.

★Data on British Columbia mineral production for 1943 showed drops in value and volume of output, number of men employed, wages and salaries, and dividends, compared with corresponding items in 1942.

YUKON TERRITORY

★Dawson miners union No. 564, International Union of Mine, Mill and Smelter Workers, CIO, has been certified by the National Wartime Labor Relations Board as the bargaining representative for employees of Yukon Consolidated Gold Corporation, Ltd., largest gold-dredging operator in Canada. The union is not empowered to act for foremen, dredgemasters, assayers, gold-room employees, timekeepers, office workers, shift bosses, surveyors, or draftsmen.

MEXICO

Courts sustain contentions of mining companies in several suits—Transportation improved

★Fall found Mexico's mining industry carrying on creditably, with steady work

and no major labor trouble, though production of base metals continued generally somewhat below par. There is a slight improvement in rail transportation with the placing of more freight cars and locomotives in service and reconditioning of key sections of rights-of-way to enable the faster movement of heavier trains by the National Railways. But some companies continue to be bothered by a shortage of gasoline and fuel oil, because efforts of the railways and Petroleos Mexicanos, the official oil company, to improve distribution of these products have not yet been altogether successful. However, the end of this year is expected to witness a great improvement of that condition.

★Mining was but briefly reported upon by President Manuel Avila Camacho in his customary annual message to the Mexican people on the occasion of the opening on Sept. 1 of the new federal congress. The report covered the period September 1943 to August 1944, inclusive, and gave the following data:

Last year, 2,700 metric tons of precious metals, valued at 291,000,000 pesos ($60,000,000), 634,000 tons of base metals, and 54,000 tons of non-metallics, with a total value of 32,300,000 pesos, were produced. But since the end of 1943 there has been a decrease in production, due largely to the tendency of buyers abroad to curtail purchasing, which has caused a drop in prices. During the year 2,624 titles for exploitation and permits to operate metal-treatment plants were issued; 3,348 concessions for working mining lots, 15 for new metal-treatment plants, and 108 for mining societies were granted, and 1,100 contracts in the industry were approved. The national commission for stimulation of the mining industry rendered small-scale mining enterprises economic assistance and is exploiting mineral deposits that are a part of its patrimony. The report did not specify the extent of the economic aid the commission is rendering. Mining was considerably benefited during the past year by the investment by federal and states governments of more than 120,000,000 pesos in road building and reconditioning. Pushing construction of the northwestern and southern Mexican sections of the Pan American Highway featured this program.

★Lack of freight cars to move ore, reported by the Mining Chamber of Mexico for several mining enterprises in Guerrero, seemingly does not involve all companies and operators. The Minas de Guerrero, S.A., announces that the National Railways is rendering excellent service from its base, Estacion Narango. The company said that it was supplied with 635 cars from Jan. 1 to July 31.

★American Smelting and the San Francisco Mines of Mexico, Ltd., paid the national miners' union 250,000 pesos ($52,500) to cover salaries during the 40-day strike at their Santa Barbara and San Francisco del Oro units, respectively.

★Miners working cooperatively failed

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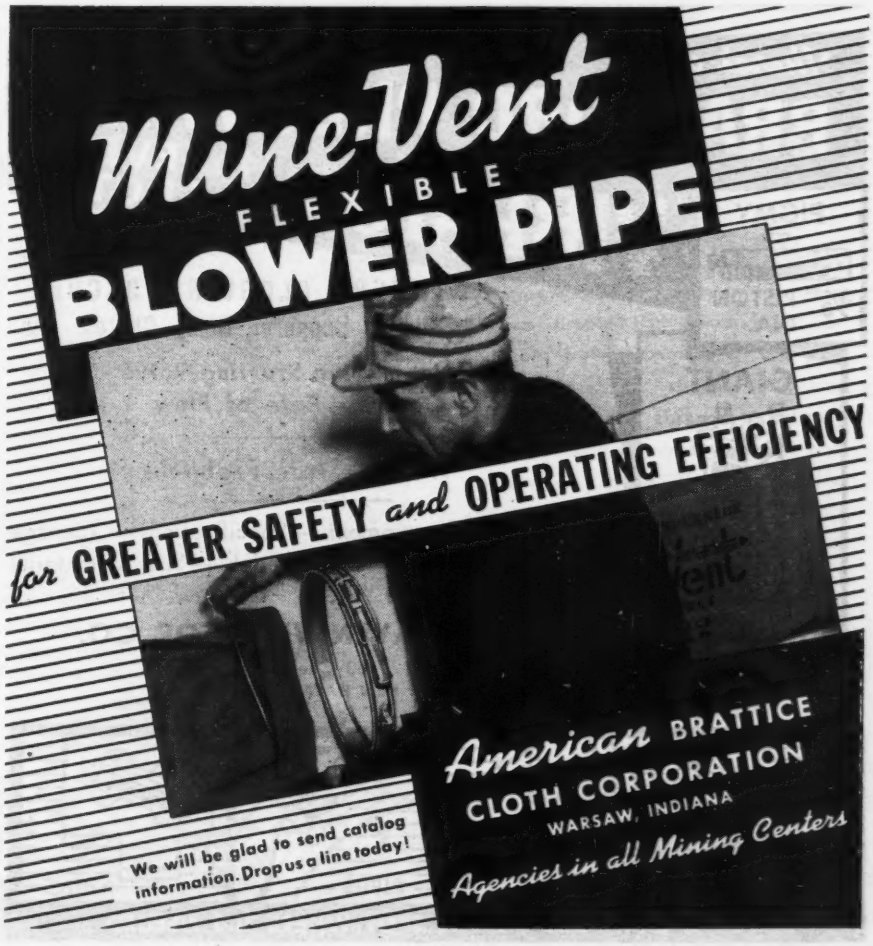
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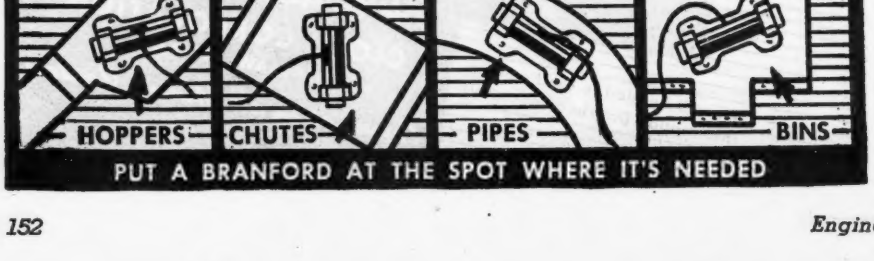

PUT A BRANFORD AT THE SPOT WHERE IT'S NEEDED

Mexico *(continued)*

to make a success after the companies quit in the Maguarichic district, Chihuahua, one-time bonanza zone of that State. Section No. 33 of the national miners' union that backed the cooperative enterprise has been allowed by the Ministry of National Economy to liquidate the business because it proved that its work was unprofitable.

★Settlement of the strike has normalized and improved conditions in the industry. So declared Juan Manuel Elizondo, secretary general of the national miners' union, in a survey of current conditions in the business. He asserted that mining will be free of important labor troubles for some years to come, as the strike taught both labor and employers several valuable lessons. The labor chief said that Mexican miners are now working with enthusiasm and a splendid spirit of cooperation to put over the top Mexico's contribution of strategic metals and minerals to the United Nations' cause. Elizondo mentioned some brief suspensions of work in the industry because of the lack of oil and gasoline.

★San Luis Mining won a precedent-setting ruling on the payment by mining and other industrial companies of indemnifications for incapacity resulting from injuries suffered in work accidents when the second district court, Mexico City, ordered set aside the verdict of the federal board of conciliation and arbitration that it pay 1,858.95 pesos ($385) to the widow of a miner who died of injuries. The court held that the board misinterpreted the labor law in its ruling and that the law stipulates that such compensations must be paid exclusively to the injured person. The board had sustained the widow's claim that she be paid the compensation. Cia. Minera y Metalurgica de Peñoles, S.A., obtained from this same court a ruling of unconstitutionality of the presidential decree of last Dec. 31 which ordered that mining companies must obtain new concessions for the operation of their metal-treatment plants. The court agreed with the company's argument that this measure violates the constitution because it stipulates retroactivity in obtaining the said concessions.

★The supreme court rendered an interpretation of the labor law in the matter of the payment of pensions by mining companies when it sustained orders of the federal board of conciliation and arbitration that the Fresnillo Co., Fresnillo, Zacatecas, pay pensions to several employees it had dismissed when their work contracts expired. The company had appealed from the orders. The court held that the labor law demands the payment of pensions to all contracted employees whom age makes eligible for that benefit in the proportion of the time they have served, even when they are dismissed at expiration of their work contracts.

★Guanajuato City sector, Guanajuato, mining companies are doing good work

in uncovering youths of 19 and 20 years of age who are subject to conscription, the municipal government announces. The companies have reported several of these boys, who, it is alleged, entered their employ to dodge conscription. According to the government, a few youths were captured hiding in deep mines and hauled off to the conscription boards. Youths of this age are not exempt from conscription because they are working in mining, for the Mexican mining industry has at present no manpower shortage problem. An injunction similar to that granted Peñoles was allowed by the same court on identical grounds to the Cia. Minera Macozas, S.A.

★The Cia. Minera Soto y De La Llave, a mercury mining company of Nuevo Mercurio, Zacatecas, has been authorized by the federal board of conciliation and arbitration to suspend work because operations became unprofitable due to the drop in mercury prices. The company laid off all its employees with due legal indemnifications. This is the first mining company forced out of business by lower mercury prices.

★Liability of mining and other companies for state taxes on the transfer of their stock was determined by the federal supreme court in exonerating Mexican Candelaria from the demand of the Sinaloa government that it pay 105,500 pesos ($21,650) as taxes on the transfer of 49,977 shares of its stock which the holder, Col. Daniel M. Burns, presented to Mrs. Rowena Burns Dunphy, a widow. The court sustained the company's contention that it must not be taxed for this transaction, a purely private one, with which it had nothing to do, and rejected the state government's argument that inasmuch as the mining firm operates in Sinaloa all transfers of its stock are subject to the state taxes on such transactions.

★San Francisco Mines of Mexico was forced to suspend work at its Clarines mine late in September on account flooding due to heavy rains in the vicinity of Parral, Chihuahua.

BOLIVIA

Mineral industry suffering decline as U. S. purchases are curtailed and prices reduced

★Since last year we have been informing our readers of the decline expected in the Bolivian mining industry. After the United States entered the second World War it signed contracts, through the agency of the Metals Reserve Co., for the purchase of strategic minerals from Bolivian producers. Hence for a few short years Bolivian production of tin, tungsten, antimony, and copper was maintained at a high level. Now, with the war approaching its end, the demand for minerals classified as strategic, which are practically the only ones Bolivia produces, is considerably cur-

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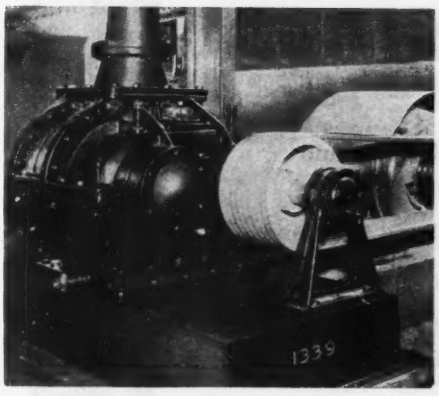

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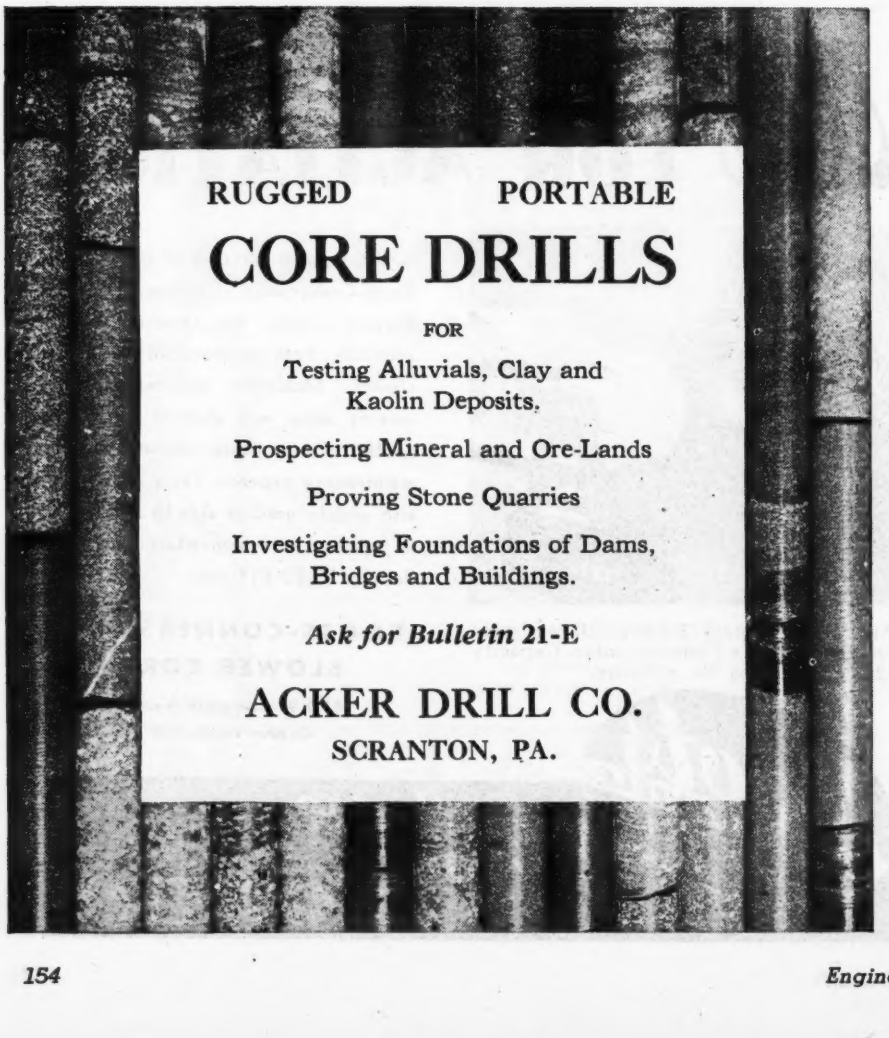

Bolivia *(continued)*

tailed. Moreover, the contracts have expired, with the exception of that for tin, for which no price adjustment has been made since June 29, 1942. These circumstances, together with increasing costs of production arising from higher paid labor, higher prices for imported machinery and materials, and even for local supplies, have seriously affected the industry.

★Statistics show that mineral exports have dropped sharply since the end of 1943. For example, tungsten exports for that year amounted to 4,141 metric tons of fine WO_3. By July, 1944, exports of that commodity had dropped to 32 tons for that month.

★Tin, by far the country's principal product, deserves special consideration. For 1943 exports reached 40,959 metric tons, in comparison with 42,740 tons in 1941 and 38,899 tons in 1942. There are good reasons to expect exports for 1944 to decline to about 36,000 tons. Following are comparative monthly figures for 1943 and 1944.

	Bolivian Tin Exports, Metric Tons, Fine Content	
	1943	1944
January	3,754	2,632
February	2,908	2,906
March	3,646	3,154
April	3,058	2,656
May	2,057	3,127
June	2,975	3,029
July	3,990	2,494
Totals	22,388	19,998

Currently, representatives of United States mineral purchasing agencies and of Bolivian producers, in Washington and La Paz, have renewed conversations about the terms that will regulate the sale of Bolivian tin ores and concentrates to the United States. Lately many small mines and some of medium size have shut down. The big mines, although still working, produce less than before. Among the medium-sized mines that have closed should be mentioned the Urania Tungsten, which worked a tungsten-tin orebody and only a few months ago completed installations for large-scale operations. This company was financed by Metals Reserve Co. Compania Minera Juliana, one of the biggest tungsten producers, with installations financed by Metals Reserve, Mauricio Hochschild S.A.M.I., and Phillips Bros., is liquidating.

Since July 1 the price of tungsten has been reduced from $22.60 to $16 per short ton unit of WO_3. The U. S. Commercial Co. has announced that it will pay only $15 after Nov. 1. These successive cuts in price are interpreted as a definite policy of the United States to stop buying Latin American tungsten.

VENEZUELA

Improved mining code to benefit industry—Varied activity points to lively future

★The Venezuelan Congress during its 1944 session, which ended in mid-July, approved a revised mining code which

will be published with the new mining bylaws as soon as they have received President Medina's signature. Although the text has not yet been officially released, it is understood that several changes have been made which will aid the mining industry, such as the lowering of some taxes, simplification of procedure in obtaining concessions, and measures for preventing speculation in large mining areas.

★Considerable interest is being taken in the reported deposits of non-metallic minerals such as beryl, gypsum, coal, mica, and feldspars.

★A representative of a subsidiary of the Union Carbide & Carbon Corp. has visited some beryl deposits in the Venezuelan Andes, and government geologists have inspected a number of reported occurrences of mica in the states of Merida and Trujillo.

★Samples of pitchblende and other radioactive ores have been submitted from a pegmatite dike near Merida which has been worked for scrap mica, and another radioactive mineral has been examined from a quarry near Timotes, also in the Andes.

★An intensive search is being made for kaolin and feldspars for use in a new local ceramic industry, and samples have been tested from Tinaquillo and from another locality nearer Caracas.

★New concessions have been taken on deposits of gypsum in the states of Guarico and Yaracuy, and the local demand has recently increased tremendously.

★The Urao (sesquicarbonate of soda) property at Lagunillas, Merida, has ceased production and most of the plant has been removed.

★The Compañia Anonima Minas de Amianto de Tinaquillo (C.A.M.A.T.) has received all its machinery and will be in production before the end of the year. The scrap from this operation will be sold to a new company, Compañia Anonima de Asbesto, with a capital of two million bolivares ($600,000), which will make asbestos-cement products in a plant to be erected at Puerto Cabello.

★La Industrial Nueva Esparta, C.A. (L.I.N.E.), continues producing small quantities of magnesite of particularly high grade, which is being used mainly in the local chemical industry, for refractories and in building construction.

★The Iron Mines Co. of Venezuela is progressing rapidly with its construction work. There has been no need to lay off men for lack of supplies as was the case during 1943.

★Interest in the development of bauxite has been renewed, and the Republic Mining & Manufacturing Co., Alcoa affiliate, has obtained an exclusive exploration license over 50,000 hectares of land in the Territory Delta Amacuro, south of the Orinoco River. A party is now in the field and exploratory and sampling work is in progress. It is also known that at least one other North American company is interested in

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Venezuela (*continued*)

finding bauxite in the Guayana shield area. A few years ago other concessions were taken out in the River Amacuro region close to the British Guiana border, but sampling did not reveal commercial quantities of bauxite.

★The International Nickel Co. has had geologists and engineers in the field for several months visiting known occurrences of nickel ore. During recent years prospecting work has been done by other engineers in a belt of basic igneous rocks intruded into the metamorphics of the Serraina del Interior, and garnierite has been found in a number of places. Values vary considerably and have ranged up to 10 percent nickel. The ore occurs superficially in a decomposed serpentine, and values have been followed to a depth of over 10 metres at some points. A thorough and systematic sampling campaign is required to prove the tonnage and average grade, and it is believed that International Nickel will commence this work within the next few weeks. One of the most promising deposits is only some 53 kilometers from the coast. A dirt road runs through the property and is connected with the main concrete highway. Conditions are favorable for cheap strip-mining, but the main problem will be the treatment of the ore, providing tonnage and grade are satisfactory.

★Local prospectors have been active for more than a year in the search for quartz crystals and Iceland spar, and numerous samples have been submitted to the government geological department as well as to the local office of the F.E.A. Samples of quartz were examined from the states of Falcon, Guarico, Garabobo, Miranda, and the Federal District, but little of value has been disclosed up to the present. The only specimens of Iceland spar yet seen came from the Federal District, but the quantity available appears insignificant.

★The increased flow of supplies and spare parts to the gold mines in the El Callao region, as a result of the concessions made to the industry by the B.E.W. in Washington last fall, has had a favorable effect on returns from the mines since March. The New Goldfields of Venezuela, Ltd., is now working at 50 per cent of capacity, and since April has been able to show a small operating profit. This has been made possible only by reducing development to a negligible amount; thus a further fall in the ore reserve figure is anticipated this year. Bonanza ore has been encountered on the No. 4 west level in the Laguna mine, which has provided the greater part of the high-grade ore for some time. The output from the Union-Sosa-Mendez mines of the Caratal Unit has been cut back considerably because of transportation difficulties, but some good ore has been disclosed in the region of the main haulage tunnel connecting the two mines. The company's own foundry

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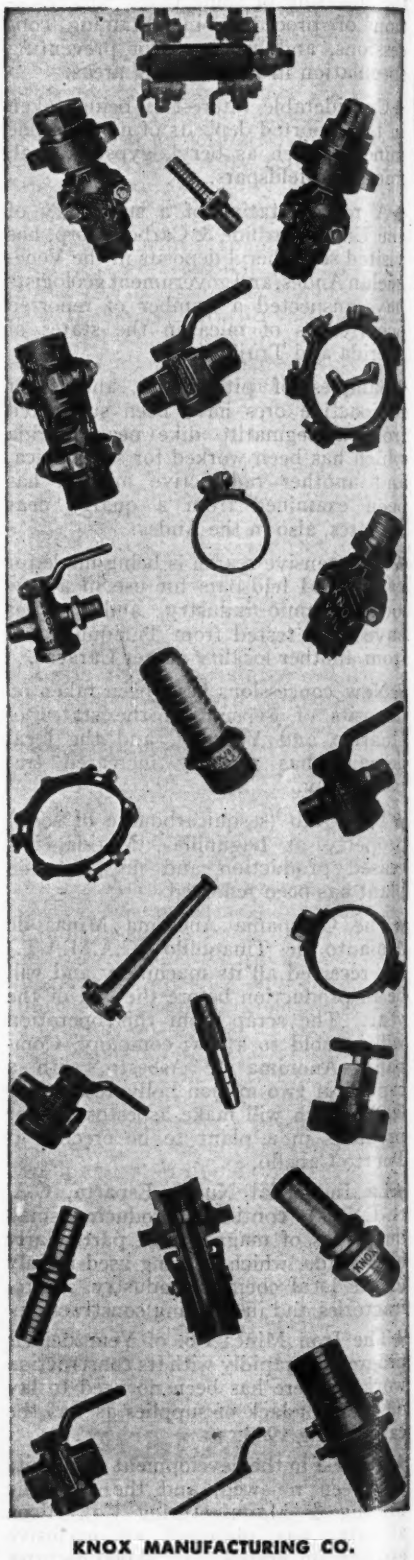

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has exceeded expectations in the variety and quality of products turned out and has proved that even in normal times it will pay to operate.

★The Compañia Francesa de la Mocupia has had numerous difficulties, but with the help of its neighbor, the New Goldfields Co., it has continued operating at about 20 per cent below capacity.

★A Venezuelan syndicate has reopened the old San Luis de Caroni property in the State of Bolivar. This mine at one time was equipped with a five-head stamp mill and treated a small tonnage of high-grade gold-quartz.

★Another group has reopened a mine at El Dorado, in the southern part of the State of Bolivar, where a rich lode was discovered some 50 years ago. At that time lack of communications and a heavy flow of water prevented development.

★Alluvial gold returns have again been adversely affected by heavy rains, but floods have not been as extensive as in the past year, and a slight improvement in production figures is expected.

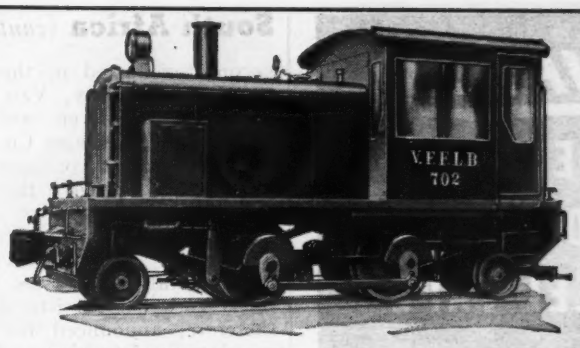
★A small group of Venezuelan capitalists has applied to the Ministry of Fomento for an exclusive exploration license covering an area of 40,000 hectares in the Gran Sabana diamond area. This region was declared a reserved zone some years ago, and up to the present no one has received a permit to explore or work in this area other than by batea or sluice. If this permit is granted it is believed that other companies will endeavor to enter the field. New York diamond firms are also interested and one of the most prominent buyers is arranging to have an agent in the Surukun field. No big finds have been reported so far this year.

★The government is doing much to improve transport conditions by making new roads and improving existing ones. However, lack of machinery and spare parts is causing delay in completion of several projects. Two new air-transport companies have been formed. One, Aerovias Venezolanas S.A. (Avensa), in which Pan-American Airways has an interest, is in operation, using tri-motored Ford planes, and will expand to cover the whole country as soon as additional planes are available. Early in July the Linea Aerea Taca de Venezuela (T.A.C.A.) was formed and will operate in this country until the end of the war, when it is proposed to link its services with that of T.A.C.A. in Colombia and other countries of the Caribbean region.

SOUTH AFRICA

Lower-ore grades, deep mining, and wage-raise demands complicate problems of Rand mining

★Due to high production cost brought about by the war, payable ore has



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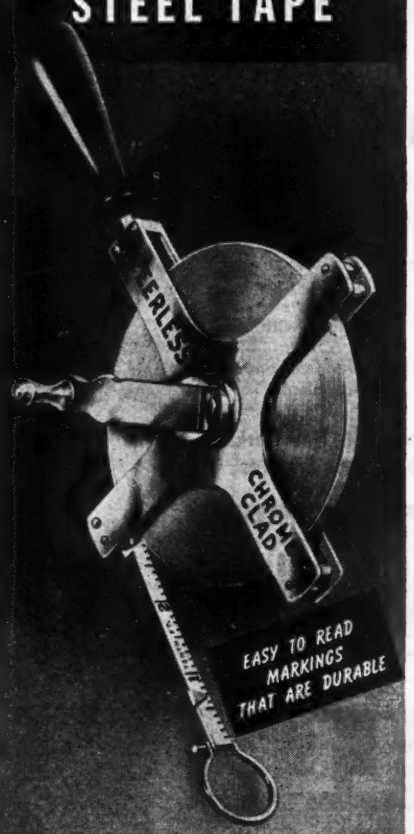

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South Africa (*continued*)

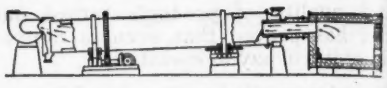
become exhausted in three mines on the Rand—namely, Van Ryn Deep, Witwatersrand Deep, and Langlaagte Estate & Gold Mining Co. In view of the position, the companies concerned have decided to give the government three months' notice of the probable closing down. This notice is required under the Transvaal Precious and Base Metals Act, 1908, Amendment Act 1926. The Minister of Mines has, therefore, announced his decision to appoint a commission under the Gold Law, to consider the position of Van Ryn Deep and Witwatersrand Deep; it is still hoped that some way may be found to prolong the life of these mines. During the first half of the present year these two mines have incurred a working loss of £6,778 and £9,686 respectively.

Langlaagte Estate has an interesting history, dating back to 1888. The original capital amounted to £450,000. The present company, with a capital of £1,519,833, represents an amalgamation of several old producing mines. During the course of a successful career the company has paid out in dividends almost ten times its original capital. Employing some 900 Europeans and more than 7,000 natives, this mine sustained a working loss of £17,355 during the first half of 1944.

★The report of the Witwatersrand Mine Native Wages Commission has brought about an increased payment to natives working on the surface of 4d. per shift and to underground laborers of 5d. per shift with payment of time and a half for all overtime and Sunday work. The government has agreed, as a temporary measure, to meet these increases in wages for each mine from a common fund into which it will pay the "gold realization charges," amounting to approximately 3s. 2½d. per ounce on gold produced for a period of one year from April 1, 1944. These so-called gold realization charges really represent a levy on the industry introduced in January, 1940.

★Discussions which have been proceeding for some months between the Chamber of Mines and the Mine Workers Union on the question of a 30 percent advance in wages for all white miners in the gold and coal mines have been submitted to arbitration. The government appointed as one of the members of this board of arbitration H. S. H. Donald, the government mining engineer, to whose nomination the Mine Workers Union objected. A deputation to interview the Prime Minister concerning the appointment will be sent.

★It is now possible to analyze the gold production in the Transvaal for the first half of the current year compared with the corresponding period in 1943. Tonnage milled at 29,136,500 tons is 1,011,500 tons down; the yield is lower by 301,395 oz., equivalent to 6d. per ton. Working costs show an increase of £635,924, or 1s. 6d. per ton, which is no less than 7s. 2d. per ounce. The



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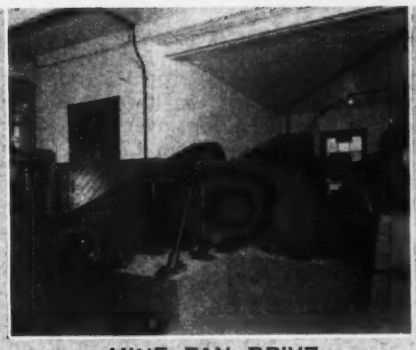

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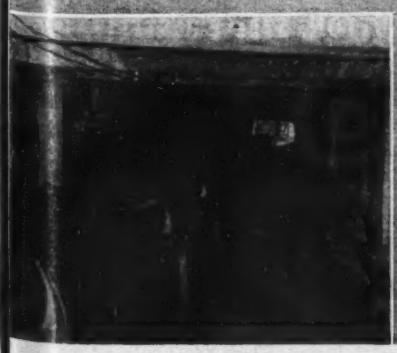
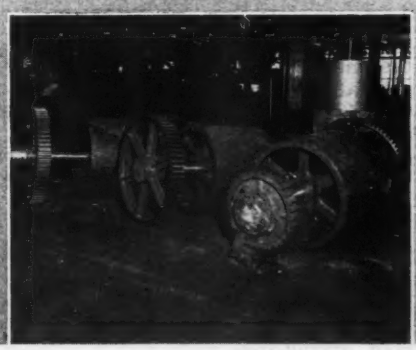


BELT CONVEYOR ACCESSORIES



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South Africa (*continued*)

profit at £16,454,607, or 11s. 3d. per ton, is 1s. 8d. per ton lower, and the dividend distribution over the same period has dropped from £7,590,245 to £6,712,751, a decrease of £877,494.

★The Chamber of Mines returns for July, 1944, show the output at 1,039,851 oz.—an increase of 1,520 oz.—valued at £8,734,748. Crown Mines was down 2218 oz. compared with June; Venterpost produced 1,003 oz. more. Rand Leases was 782 oz. up, West Rand Consolidated 858 oz. up; Durban Deep 812 oz. up, and S. A. Lands 847 oz. lower.

★The labor position shows that in the Rand gold mines the number of natives employed is 295,162, and in the coal mines 25,693, the total number representing a drop of 3,774 during July. Native labor requirements are far in excess of the supply.

★The Treasury has consented to the issue of capital up to £1,000,000 by Union Mines & Exploration, Ltd., which is in course of formation, to finance and bring to production certain major coal deposits in the Transvaal and Natal as well as for the exploration of certain gold farms in the Transvaal and Orange Free State in which new Union Goldfields, Ltd., and East Rand Gold & Estate Co., Ltd., have recently become interested.

★Anglo American Corp.'s newest flotation, Vaal Reefs Exploration & Mining Co., Ltd., which adjoins Western Reefs, has been introduced on the Johannesburg Stock Exchange. Some 200,000 shares were offered to certain privileged subscribers and were applied for 17 times over. Issued at 12s. 6d., these 10s. shares were quoted at 17s. 10½d. at the close of the first day's business. Drilling operations have been resumed on the company's property. Previous boreholes have already proved the existence of gold-bearing strata.

AUSTRALIA

Value of 1943 mineral output drops—Queensland beach sands mined for zircon and rutile

WESTERN AUSTRALIA

★The State Department of Mines has reported that the estimated value of the mineral output in 1943, calculating gold at £4-4-11.45 per oz., was £A2,996,152, a decrease of £A1,246,368 compared with the record for 1942. Including the value of the premium paid to gold producers, the gross value of all minerals was £A6,385,541, compared with £A9,505,176 in the previous year. There were decreases in tonnage and value of some metallic and non-metallic minerals, but the great part of the decline was due to the lower output of gold, arising from restricted manpower

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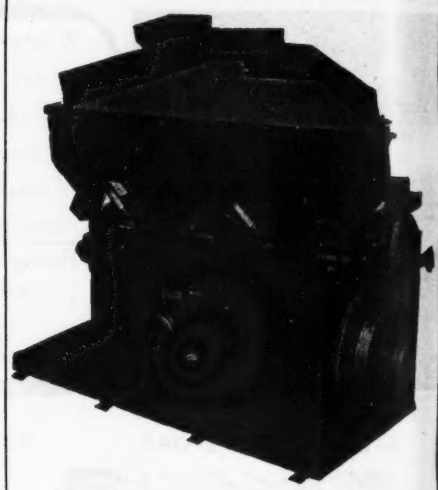

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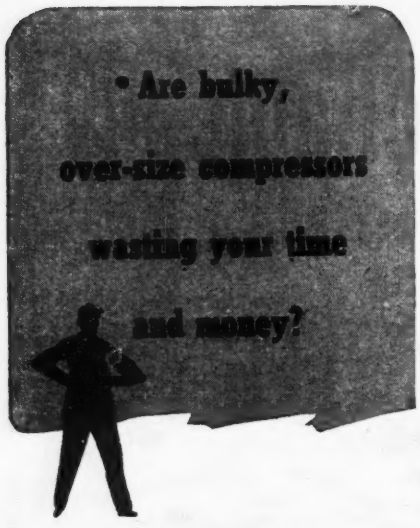

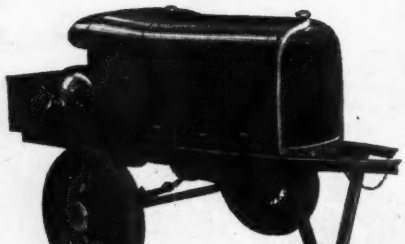

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Australia (*continued*)

and difficulties in obtaining stores and equipment. The estimated value of the gold received at the Perth mint and exported in gold-bearing material was £A5,710,668, and equaled 89.43 percent of all minerals. Increased attention was given to the production of non-metallic minerals, and a greater variety was mined than in previous years. Dividends paid by mining companies amounted to £A597,546, an increase of £A173,834 when compared with 1942. To the end of 1943 the total dividends paid by gold mining companies was £A40,437,449, and to the same date the value of the mineral production amounted to £A228,084,433, based on normal values, but premiums on gold increase the total value of gold and minerals by £A57,206,615. In 1943, 24 of the larger mines, all employing more than 20 men, mined and treated 1,944,797 tons of ore for the recovery of 471,386 oz. of gold. Under restricted manpower conditions, the total labor employed was 3,919 men. The average tonnage per man broken on these mines was 496, and the average gold produced 120 oz. per man. In 1942, the tonnage of ore mined per man was 397 tons and the quantity of gold produced per man was 104 oz. In that year the mines on the Kalgoorlie goldfield produced 481 tons of ore per man employed and 145 oz. of gold per man.

★Sons of Gwalia, Ltd., the big mine of the Leonora district, which has reached a depth close to 5,000 ft. from surface on the underlie, made a net profit of £51,953 for 1943, compared with £83,813 for 1942. The fall is due to lower output and higher costs occasioned by the shortage of labor, increased prices for stores, and the difficulty in obtaining supplies of many items. In prewar days the average monthly output of ore was about 11,000 tons, but the production of 6,204 tons of ore for July is typical of production under present conditions. This tonnage yielded 1,685 oz. of gold, an average recovery of 5.44 dwt. per ton. The main development horizon is No. 31 level, on which driving south has exposed ore assaying 5.9 dwt. per ton over the width of the opening, 96 in. On No. 30 level, the south drive was in ore worth 4.2 dwt. per ton. Winzing from No. 29 level disclosed values of 5.9 dwt. over 60 in. at a distance of 1,990 ft. south. At 2,200 ft. south, winzing had reached a depth of 163 ft. in ore of an average grade of 6.4 dwt. per ton over a width of 60 in., the width of the winze, with an additional 38 in. worth 8.7 dwt. exposed in a footwall crosscut. Sons of Gwalia is one of the deepest mines in the State, and geological conditions at the bottom level strongly favor vertical extension of the lode. The country rock stands well. Open stoping and filling is the mining method used, but some difficulty is caused by the dip of the lode being from 40 deg. to 42 deg., slightly below the angle of repose, whereby special provision has to be made in the layout of ore passes from the

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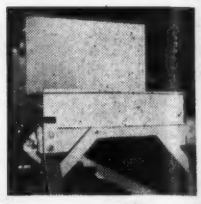

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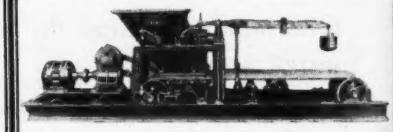

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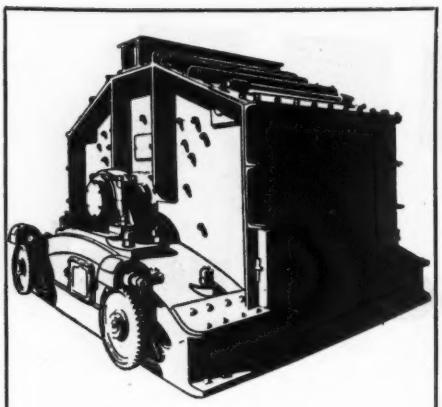

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Australia *(continued)*

stopes, and in winzes for the transfer of filling. Total length of the profitable ore channel exceeds 2,000 ft., but the pitch of the shoots has carried them away and to the south of the main underlay shaft. To meet this condition an internal shaft was sunk from No. 30 level for the working of the deeper levels.

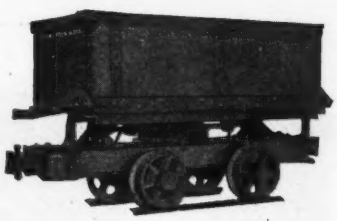
★Concern is expressed in Western Australia over the continued fall in gold production and the failure of the Commonwealth government, notwithstanding expressions of sympathy, to release labor for the mines. The average number of men employed is now below the quota agreed upon, and as it includes many over-age men, and many of low efficiency, the effect on the production and the operating costs of the industry is serious. The time appears to have arrived when additional labor should be made available to get the mines into a condition for the rapid absorption of manpower, but large numbers of men continue to be retained in government undertakings of more than doubtful utility and value. For the seven months, January to July, 1944, the State's production of gold was 249,968 oz., compared with 320,227 oz. in the same period of 1943 and 512,171 oz. in the corresponding months of 1942.

NEW SOUTH WALES

★Broken Hill town and mines are facing the possibility of a water shortage, following prolonged drought, and the situation is the worst since 1927. Water supply is drawn from two reservoirs, the Stephens' Creek, with a capacity of 3,940,000,000 gal., and the Umberumberka reservoir, with a slightly larger capacity but a larger catchment area. Average rainfall is 9.7 in. per annum, but its distribution is irregular and may vary from 3 in. to 16 in. per year. Alternative proposals are being considered to insure adequate supplies in future years. One is the construction of an additional reservoir in the lower part of Stephens' Creek, and the other the construction of a pipe line from the Darling River, 100 miles distant, and the provision of water by pumping. Such is the irresponsible attitude of labor these days, that the Broken Hill miners have been striking one day a week to impress on the government the need for an additional water supply. Water in the Umberumberka reservoir is sufficient to last until October.

QUEENSLAND

★Important beach sand deposits containing zircon, rutile and ilmenite, considered as being, probably, the world's most important source of zircon, have been worked for a number of years by Zircon, Rutile, Ltd., at Byron Bay, in New South Wales. Similar beach sands extend beyond the border along the Queensland coast for a distance of 60 miles, and there is now considerable activity in their prospecting and development. Although the Byron Bay occurrence had been worked since about



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AUSTRALIA (*continued*)

1930, it was not until 1941 that the Queensland deposits were seriously considered. The deposits, usually called "black sands," are composed mainly of white quartz grains, and occur in an horizon between high- and low-water marks, and are usually almost horizontal. Prospecting has been carried out to shallow depths below the zone being worked and which would be below low-tide level, but no deeper black sand beds have been located, though prospecting has not been continued to bedrock.

In the New South Wales beach sand occurrences it is thought that the mineral contents have been derived from Tertiary deep leads underlying basalt, the minerals having been subsequently distributed along the beaches, for it is recorded that these occurrences are usually in the vicinity of basalt. Concentration is probably due to the combined actions of ocean currents, waves, tides, and settlement due to varying specific gravities of the minerals. The grains are usually well-rounded and are of somewhat the same size as the white beach sand. The layers of mineral sand are dark gray to black in colour. On the Queensland coast they vary from 1 ft. to 5 ft. in thickness, with an exposed width of 25 ft. to 30 ft. The width is indefinite, for sand dunes flank the inland side of the beaches, necessitating the removal of large quantities of sand for the exposure of the inward extension of the sand beds, which, in view of the great extension along the coast, is not justified. The approximate mineral composition of the black sands is: Zircon, 40 to 45 percent; rutile, 30 to 35; and ilmenite, 20. The remainder is composed of garnet, tourmaline, topaz, monazite, cassiterite, magnetite, with minor amounts of gold, platinum, and silver.

In the present state of development, reserves cannot be estimated, but there is a stretch of some 60 miles of potentially productive country, exclusive of the beach sands southward in New South Wales, and no effort has been made to follow the beds under the deeper cover of the sand dunes. The Zircon Rutile Co., at Byron Bay, in New South Wales, recovers the minerals in a mixed concentrate from which separation of the individual constituent minerals is effected by flotation, but procedure and reagents are not disclosed. The Minerals Deposits Syndicate, in Queensland, is making a primary concentrate on concentrating tables. The mixed concentrate was originally shipped, but a magnetic separator has been added to the plant, and a high-grade monazite concentrate is now being produced. The product from most of the plants is a mixed concentrate, but efforts are being made to produce clean concentrates of individual minerals, mainly rutile and zircon, and for this purpose a combination of gravity, flotation and electrostatic methods offers the best scope for satisfactory results. Mining is effected largely by bulldozers and portable elevator-conveyors, while one company has installed an electrically driven gravel pump mounted on a pontoon. Large occurrences of zircon-rutile-ilmenite sands occur near the west coast of King Island, Tasmania, and although a considerable amount of test work was done on them about 1930, they have not received attention since the war has increased the demand for these particular minerals.

TASMANIA

In advancement of the proposed aluminum ingot industry in the island, an agreement has been made between the State and the Commonwealth governments providing a sum of £A1,500,000 by each party for the establishment of the works. Application has been made for the first £A500,000 for the purchase of plant and machinery. Ample cheap electric power is available, but the readily available Tasmanian ores are not of high grade. If ore is obtained from the mainland, as is probable, it will be of little better grade, and will have to carry the added cost of transport to the port of shipment, ocean freight to a Tasmanian port, and transport thence to the works.

APPRECIATIONS

(*Continued from page* 128)

the Mina El Oro in Argentina, and the Minas de Abangarez in Costa Rica.

Throughout his life, Mr. Malozemoff was highly regarded by all who knew him, a regard founded by no means on his professional achievements alone. He was a man of profound culture, whose knowledge of and fondness for music, painting, and literature made him at home with the leading contemporary exponents of the arts. He was, of course, keenly interested in the political scene, and his international outlook and analytical mind made him a compelling conversationalist. Despite the complete understanding and insight with which he viewed his fellow men in this time of destruction, he held steadfast to a faith in a better destiny for humanity.

If he had ever thought of casting up accounts on his life, the asset of which he would have been proudest would be the number of young engineers whom he had helped to a start in their chosen profession. This fact, as well as the many useful enterprises he helped build, will stand as his monument.

A LETTER

Miseducation on Minerals

The Editor,
New York World-Telegram,
New York, N. Y.

Dear Sir:

I am writing with reference to the following quotation from your recent editorial entitled "But Will the Supply Hold Out?"

> "At the end of this war our supply of high-grade Lake Superior iron ore will be sorely depleted—at the present rate of consumption it will last only six to ten years. Our deposits of high-grade copper are practically exhausted. Our resources of zinc have almost reached the vanishing point. We are dependent on imports for practically all our nickel and tin. Our resources of bauxite, from which aluminum is made, are meager. Our oil production has reached its peak, and will decline rapidly. Only of coal do we have plenty.
>
> "We should see to it that we are repaid, under Lend-Lease, in the raw materials we have expended so lavishly. We must change our national habit of waste."

In my opinion, the extent of depletion indicated in the foregoing quotation is greatly exaggerated. Present rates of mineral consumption are roughly double those that prevailed before the war. Therefore, we have no reason to assume that the present rates of consumption will go on after this year.

In regard to iron ore, the over-all supply of high-grade shipping ore is expected to last for 20 years or more. Means are already at hand and will be improved in the intervening time that will make the beneficiation of our enormous low-grade reserves possible. There is every reason to believe that the cost of the beneficiated product will be so little more than that of the high-grade ores, that final consumers—possibly even industrial consumers—will never know the difference.

In regard to copper, we have depended primarily on low-grade copper ores for a long time. Although depletion is taking place, our copper reserves are far from being exhausted. I do not know on what basis the statement is made that our resources of zinc have almost vanished because even the most pessimistic observers in the industry assume that domestic mines can count for more than half our needs into the indefinite future. We have always been dependent on imports for nickel and tin, so the outlook is no different from past experience. Our bauxite reserves have never been very much in comparison to our probable future needs for aluminum. An abundance of bauxite exists in this hemisphere. In case some exigency of wartime should sever our connections with these sources, we have the means of making aluminum from clay and other aluminous materials.

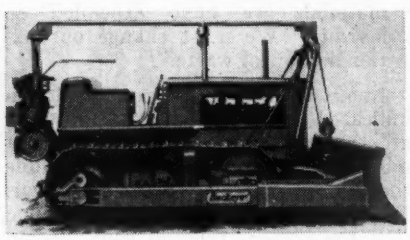
Therefore, there is no need for getting panicky over our mineral reserves. The situation does call for competent scrutiny and the development of a national policy on minerals based on sound reasoning, but we still remain one of the wealthiest nations on earth in terms of minerals.

Very truly yours,
EVAN JUST, Editor
Engineering and Mining Journal

EQUIPMENT NEWS

Bulldozer and Trail Builder

A new cable-controlled bulldozer and trail builder known as Centro-Lif has been announced by Buckeye Traction Ditcher Co., Findlay, O. The device is offered in two models, with or without power control unit, for use on Allis-Chalmers tractors. The new design is engine mounted, and the cable is carried overhead from winch to moldboard. The principle feature is the center lift



construction of the moldboard, which provides light weight, simple construction, and straight lift of blade. Moldboard can be angled to the right or left, and can be tilted through a vertical adjustment of 12 in. at the end. Maximum height of lift of leading corner of blade is 53 in.; digging depth of blade below grade is unlimited. Moldboard is 12 ft. $9\frac{5}{8}$ in. long and $37\frac{9}{16}$ in. high and is fitted with reversible cutting edge and replaceable corner bits. The same company also announces a new side-lift bulldozer and trail builder for Allis-Chalmers tractor HD-7.

Compressor Control

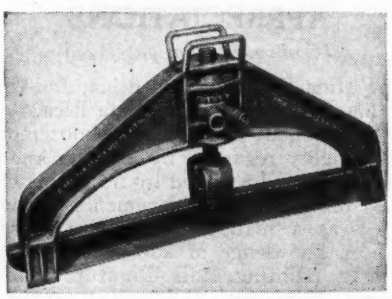
An instrument combining seven devices for control of compressor operations into a single compact unit is announced by Manning, Maxwell & Moore, Inc., Bridgeport, Conn. The Ashworth Compressor-Trol is made in three sizes, $\frac{1}{2}$, $\frac{3}{4}$, and $1\frac{1}{4}$-in., determined by inlet connection, for tank-mounted compressors up to 15 hp. or 60 cu. ft. per min. Equipped with Ashcroft Duraswitch, with either electrical or mechanical attachment for operating the two-way unloading valve mounted on the control casting. The entire gage is removable and replaceable in case of accidental damage.

Mine and Industrial Storage Battery

Incorporating a new principle of fabricated glass tape insulation, which is said to lengthen the efficient life of the battery's power-producing plates, the Storage Battery Division of Philco Corp., Trenton 7, N. J., announces a new battery known as the Philco Thirty. The battery is suitable for industrial trucks or for mine locomotive and shuttle car service. In this battery the company has replaced glass mats with a jacket of glass tape wrapped around the plates in a double layer, one horizontal and the other vertical, with ample overlap to insure a homogeneous film.

Rail Leveler

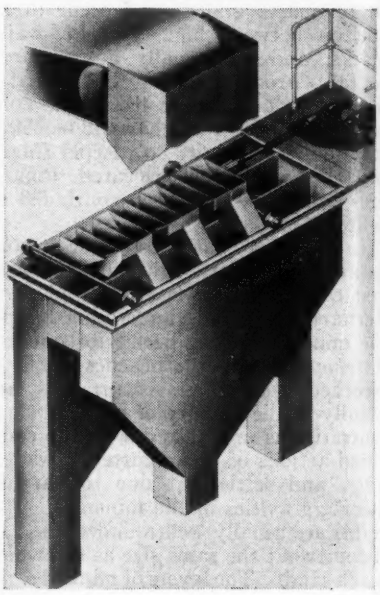
A line of rail levelers designed to level rails up to 25-, 40-, and 80-lb. weights, respectively, is being made by Gibraltar Equipment & Mfg. Co., Alton, Ill. As illustrated, clamps at each end of the leveler frame slip down over the head of the rail at points adjacent to the spot where the head of the rail is sunken, or "hogged." At this point two hinged jaws slip over the head of the rail and are free to close tightly around it when pressure is applied on the operating screw through a ratchet. The lower end of the screw is machined half-round, and fits the top, or socket, end of the



hinged jaws. A heavy-duty Timken type thrust bearing is contained in the ratchet assembly to absorb thrust stresses and increase the efficiency of the unit. A double handle at the top protects the screw and makes for easy portability.

Reciprocating Riffle For Distributing Ore

The accompanying illustration shows a device that can be used to divide into two, three, or more equal parts a stream of granular material flowing over a belt or down a chute. It was developed by A. J. Boynton & Co., metallurgical engineers, Chicago 4, Ill., in connection with a bin system for bedding and reclaiming metallurgical raw materials. The illustration shows a distributor of three compartments, each discharging through a chute. Mounted on wheels and running along the lower structure is a riffle of nine divisions which alternate in their discharges to the three compartments. The over-all length of the riffle assembly is one and one-half times the width



of the conveyor belt. The riffle moves forward and back through a distance equal to half the width of the conveyor, with the result that material delivered from any point along the width of the belt goes during one-third of the time into each of the three compartments. The speed of reciprocation is constant, determined by the constant speed of the motor and the ratio of the reducing gear of the drive.

Ore-car Thawing Furnace

Designed to overcome the difficulties encountered in dumping frozen ore from freight cars, Rust Furnace Co., Pittsburgh, Pa., has developed a chamber and furnace that obviates the use of the crude methods frequently used to dump frozen ore. It consists of a two-car thaw chamber; two furnaces with rated capacity of 10,000,000 Btu. per hour each; two oil-fired furnaces, combustion air fan, steam supply line for fuel atomizing, and motor-driven air recirculating fan. The operation becomes automatic after the cars are closed in the thaw chamber. The thawing cycle is adjustable, depending on the hardness of the freeze: (1) 10 min. flash heating in excess of 500 deg. F., (2) cutback to between 200 and 250 deg. F. for 5 to 10 min. of soaking. Opening the chamber automatically stops the operation.

Magnetic Separation By Wet Process

To be used principally for concentrating ores and minerals by the wet process, Stearns Magnetic Mfg. Co., Milwaukee, Wis., has recently devel-

NOW...ANOTHER REVOLUTIONARY PRODUCT OF PHILCO BATTERY RESEARCH!

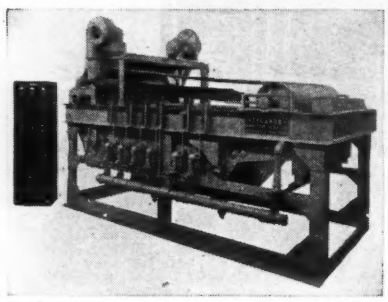
The New "PHILCO *Thirty*" *gives 30% Longer Life*

A few months back Philco pioneering gave industry the outstanding development in stationary batteries—Philco Vitrabloc. Today, Philco engineering research scores again—with the top advance in mine locomotive and shuttle car batteries—the new "Philco Thirty." With 30% longer life, and *more*—with new economy in maintenance and lower depreciation—here is headline battery news. Here, for the first time in any battery, is a revolutionary new principle of fabricated insulation—developed, proved and backed by Philco. Here, too, is that famous 10% extra work capacity made possible by Philco's modern plate design. Ready today, is this great new post-war battery—the new "Philco Thirty"—now available in certain types and limited quantities. Write for full information.

PHILCO CORPORATION, *Storage Battery Division, Trenton 7, New Jersey*

For 50 Years a Leader in Mine Storage Battery Development

oped a magnetic separator with distinctive features. The material to be treated enters the machine through an inclosed spout with a controlled water pressure feed which disseminates and spreads the material in a thin uniform layer on the underside of a submerged moving belt. Here it is picked up by the magnetic field and carried through the successive magnetic zones individually controlled by rheostats which provide clean concentrates, middlings, and tailings. It is claimed that clean separation is further augmented by a special design of magnet pole pieces that subject the material to a zigzag movement in the process.



INDUSTRIAL NOTES

The Army-Navy "E" for excellence in production has been presented to employees of the following companies: **Brown Instrument Co.,** Philadelphia, division of **Minneapolis-Honeywell Regulator Co.,** third award; Newburgh, N. Y., Fabrikoid plant of **E. I. duPont de Nemours & Co.; Cleveland Lighting Division, Westinghouse Electric & Mfg. Co.**

H. K. Porter Co., Inc., Pittsburgh, Pa., has purchased Fort Pitt Steel Casting Co., McKeesport, Pa., manufacturers of pressure and alloy steel castings.

American Steel & Wire Co., Chicago, Ill., announces the retirement of **O. T. Allen** as assistant manager of construction materials sales and the promotion of **M. E. Capouch** as his successor.

The Foxboro Co., Foxboro, Mass., manufacturers of industrial instruments for measurement and control, announces the addition of **Paul Torre** to the staff of sales engineers covering the New England territory. **Walter H. Ridley** has joined the sales promotion department at the head office.

Battelle Memorial Institute, research organization, Columbus, Ohio is the recipient from the War Department of the Ordnance **Distinguished Service Award** for outstanding contributions to ordnance progress.

Walter P. Hallstein, Jr., has been appointed assistant manager of the belt sales department of the **Goodyear Tire and Rubber Co.,** Akron, Ohio.

R. G. Wingerter has been appointed assistant chief engineer of the industrial division of **Timken Roller Bearing Co.,** Canton, Ohio.

Col. Walter F. Siegmund has been appointed general sales manager of the **Olin Corp.,** with headquarters at East Alton, Ill. He will coordinate and direct sales activities of the company's affiliates engaged in the manufacture of explosives and related products. **Olin Corp.** also operates an aluminum reduction plant at Tacoma, Wash., and controls **Kalunite, Inc.,** which has under construction a plant near Salt Lake City, Utah, for the production of alumina.

Frank C. Angle, manager of **Allis-Chalmers** sales activities in the Pacific region, has been appointed manager of all the company's field sales offices of the general machinery division. He will continue to supervise operations in the Pacific area.

Albert H. Killinger, vice president and director of **Laclede-Christy Clay Products Co.,** St. Louis, Mo., died at Durango, Colo., Aug. 18.

Edward B. Yancey, who has been general manager of the company's explosives department since 1935, has been elected a vice president and member of the executive committee of **E. I. du Pont de Nemours & Co.,** Wilmington, Del. He has been succeeded in his former position by **William H. Ward,** who has been assistant general manager. Other promotions in the explosives department are: **H. F. Brown,** assistant general manager; **P. J. Kimball,** general superintendent; **F. R. Wilson,** manager of the explosives division.

Eimco Corp., Salt Lake City 8, Utah, has opened a new branch office in the Paul Brown Bldg., St. Louis, Mo., in charge of **James K. Russell.**

Rupert K. Stockwell, in charge of Pacific Coast sales of **Robins Conveyors, Inc.,** Passaic, N. J., died at his home in Oakland, Calif., Aug. 24. He joined Robins in 1911, and with the exception of five years spent in Chile with Braden Copper Co., he had represented Robins in Europe, China, Japan and the Far East.

Myrl Ray, manager of the Utah department of the **Denver Fire Clay Co.** in Salt Lake City, died Aug. 22 at the age of 55. He had been associated with the company since 1919.

Phillips Mine and Mill Supply Co., of Pittsburgh, Pa., has been appointed district sales representative for the **Hyster Co.,** Portland, Ore.

E. F. Houghton & Co. announces that its New York City office, formerly at 421 Seventh Ave., has been combined with its office and warehouse at 135 Hoboken Ave., Jersey City 2, N. J.

Fairbanks, Morse & Co., Chicago, Ill., has purchased the **Pomona Pump Co.,** a division of Joshua Hendy Iron Works, Sunnyvale, Calif. Hereafter Pomona pumps will be known as **Fairbanks-Morse-Pomona,** and **Fairbanks-Morse-Westco line.**

Pioneering Engineering Works, Inc., Minneapolis 13, Minn., has been authorized by the **Kensington Steel Co.,** of Chicago, to build the Oro manganese-steel apron feeder.

BULLETINS

Mine Blowers. Bull. 783. Jeffrey Manufacturing Co., Columbus 16, O. Illustrating and describing a variety of blowers and exhausters for mine use.

Loaders. Eimco Corp, Salt Lake City 8, Utah, has published a new bulletin emphasizing the merits of its loaders, for which it has adopted the trade name RockerShovel.

V-belt Drives. An informative 44-page handbook on industrial fractional horsepower V-belt drives will be sent on request to B. F. Goodrich Co., Akron, O. The booklet describes belt construction, and notes trend toward larger sheaves. A chapter is devoted to proper selection of belt drives and gives helpful horsepower ratings and engineering data.

Wedge-Slot Screen. Hendrick Manufacturing Co., Carbondale, Pa., will send on request a 4-page bulletin illustrating and describing a screen made of wedge-shaped profile bars held in position in a frame. Suitable for both wet and dry screening, and in flat or curved form.

Flow Meter. Bulletin 350 of Builders-Providence, Inc., Providence, R. I., shows a propeller-type, direct-reading instrument of Venturi design for main-line metering. Suitable for water at temperatures ranging from just above freezing to 120 deg. F.

Hose Clamp. Punch-Lok Company, Chicago 7, has published a descriptive catalog of its mechanical device for connecting various kinds of male and female fittings, special nipples, or ordinary pipe to hose.

Speed Reducer. Catalog No. 300 issued by the Cleveland Worm & Gear Co., Cleveland 4, Ohio, illustrates and describes the company's Speedaire fan-cooled worm gear reduction units. An exhaust fan on the coupling draws a cooling stream of air between the double walls of the lower half of the unit.

Folding Ladder. A light-weight safety ladder that folds into a bundle 3x3 in. Equipped with lock to insure rigid open position, and safety shoes to prevent slipping. Folder on application to Duo-Safety Ladder Corp., Oshkosh, Wisc.

Lubrication. Alemite Division, Stewart-Warner Corp., Chicago, has published four bulletins illustrating centralized lubricating systems for small, medium, and large heavy-duty machinery where it is desired to lubricate many bearings from a central point.

Mining Equipment. Robt. Holmes and Bros., Inc., Danville, Ill., has issued a general bulletin on its line of mining equipment and replacement parts.

Welding. Eutectic Welding Alloys Co., New York 13, will send on request a leaflet on the theory of soldering, brazing and low-temperature welding.

Valve Care. Reading-Pratt & Cady Division, American Chain & Cable Co., Bridgeport, has prepared a chart illustrating "Do's and Don'ts" in the handling of valves.

Meehanite. Bull. No. 20, "The Metal for Wear Resisting Castings." Meehanite Research Institute of America, Inc., Pershing Square Bldg., New Rochelle, N. Y.

Bottom-dump Trucks. Brochure of the Euclid Road Machinery Co., Cleveland, Ohio, illustrating applications of bottom-dump Euclids in earth moving.

Pumps. Bull. 447 of Chain Belt Co., of Milwaukee, Wis., on its line of Rex speed prime pumps.

Heat-Resistant Coatings. Bull. No. 925, issued by Preferred Utilities Mfg. Corp., New York 23, N. Y. Describes "White Hot" and "Pyro-Chrome" for service at temperatures up to 2,840 deg. F. and 4,000 deg. F., respectively.

Beam Compass. A compass capable of making circles in ink or pencil from one to 48 in. in diameter. Charles Bruning Co., Inc., New York 13, N. Y.

Wire and Cable Insulation. A leaflet of General Cable Corp., New York 17, N. Y., describes Gencaseal, a synthetic coating for wire and cable, serviceable where rubber is unsuitable.

Earth-Moving Equipment. An 8-page pamphlet illustrating applications of the Tournapulls of R. G. LeTourneau Inc., Peoria, Ill.

Drill-dust Collector. Bull. 4402 of Ralph B. Carter Co., 192 Atlantic St., Hackensack, N. J. Markley-Carter system of portable collectors of accurate dust samples in open pit mining operations.

Control Instruments. The Bristol Co., Waterbury 91, Conn., has published new bulletins, as follows: No. A115 on a new line of air-operated controllers for temperature, pressure, vacuum, liquid level, humidity, and flow; No. P1202 on radiation pyrometers; No. P1200 on time-program control on a new Pyromaster potentiometer pyrometer.

Forgeability of Steels. Timken Roller Bearing Co., Canton 6, Ohio, has issued a 78-page book containing recommended forging temperatures of 68 steels.